THE DEVELOPMENT AND EMPIRICAL TESTING OF AN EXPLANATORY STRUCTURAL MODEL OF EMPLOYEE GREEN BEHAVIOUR

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DECLARATION

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ABSTRACT

This study argues the importance of environmental sustainability and the critical role that organisations and individual employees play in contributing to organisations' environmental performance. This rises the need to determine the factors that influence employee green behaviour (EGB). EGB should thus be defined, measured, and enhanced through human resource (HR) interventions.

The objective of this research study is to investigate why there is variance in EGB among employees and to propose an explanatory EGB structural model in response to this research-initiating question. In an attempt to grasp the complexity of the behaviour of working man, various latent variables are hypothesised as determinants of EGB and their relationship in the larger nomological network of person-centred and situational latent variables that have a direct and indirect influence on EGB.

In this study, an EGB structural model is proposed. Due to the size of the original model, the model was revised and reduced to allow for empirical testing. An *ex post facto* correlation design with Structural Equation Modelling (SEM) analysis technique was used to test the proposed research hypotheses. Moreover, a final sample of 221 permanent and fulltime employees that work in the private or public sector in South Africa, participated in the research study. Based on the results, data- and theory-driven recommendations are given for future research. Practical managerial recommendations are also derived from the proposed EGB structural model.

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I want to thank God. Thank you for life, for freewill, an abstract thinking ability and the freedom to make decisions and engage in behaviour. Thank you for the complex and unique way that You made us.

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"What a beautiful world we get to live in"

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CHAPTER 1
INTRODUCTORY ARGUMENT

"One way or another, the choice will be made by our generation, but it will affect life on earth for all generations to come."- Lester Brown

1.1. INTRODUCTION

Organisations are man-made phenomena, that originate with the goal of generating profit by serving society through their core business. Organisations' core *raison d'être* is to serve and give back to society. This is done by combining and transforming scarce resources that a society has access to, into products and services that this society values (Theron, 2016a). Profit serves as both the incentive to serve society, as well as the barometer which measures the extent to which organisations succeed in doing so[1]. Although profit is a necessary condition for organisations to serve society in a rational manner, it cannot be put forward as a sufficient criterion for evaluating the success with which organisations serve society.

Slaper and Hall (2011, p. 4) discuss a sustainability framework that looks at three performance dimensions for evaluating the success with which organisations serve society. The triple bottom line (TBL), developed by John Elkington, measures an organisation's performance in terms of *profit*, *people* and *planet* (Slaper & Hall, 2011, p. 8). Organisations are recognising the importance of focusing on their economic (profit), social (people) and environmental (planet) performance. Due to a greater focus on non-profit factors such as people and planet mentioned by Slaper and Hall, organisations are increasingly held responsible for their actions and impact on these two performance dimensions. According to Slaper and Hall (2011, p. 6), "the TBL and its core value of sustainability have become compelling in the business world due to accumulating anecdotal evidence of greater long-term profitability."

Organisations' core business needs to serve society in a manner that serves the environment as a whole. Organisations are subsystems that form part of a bigger ecosystem, where they mutually depend on one another. As such, the TBL can be thought of as *provisos* in terms of which organisations as subsystems are allowed to exist within the larger system. Violations of any of these *provisos* increase the risk of punitive sanctions from the larger system that could threaten the sustainability of these subsystems. Considering the critical role that organisations play in society, organisations can be viewed as members of the community. Because of this membership, they have the responsibility to be active participants that actively promote both the short-term and the long-term interests of society. Hart (1997, p. 71) argues that

[1] It is acknowledged that this line of reasoning rests on the assumption of a sophisticated and knowledgeable consumer.

"corporations are the only organizations with the resources, the technology, the global reach, and, ultimately, the motivation to achieve sustainability."

Jones (2014) asserts that economists typically tend to consider short-term profits and tend to ignore the long-term consequences of organisational operations. In the past, organisation and humankind have thought of the earth and the environment as a bottomless pit with unlimited resources. Human activities did not consider caring for the environment or protecting its resources; instead, these resources were plundered with very little immediate consequences. Over the years, research has found that the earth does in fact not have unlimited natural resources and that the current rate at which the earth's resources are exploited is not at all sustainable (WWF 2012, 2014).

The *Living Planet Report* of 2014 (WWF, 2014, p. 9) establishes that for more than 40 years, humanity's demand has exceeded the planet's biocapacity, which is "the amount of biologically productive land and sea area that is available to regenerate these resources." The earth is currently experiencing various environmental issues, for example, climate change, industrial (as well as air, water, and soil) pollution, deforestation, exhausting fossil fuels, excessive waste, declining biodiversity, ozone depletion, electricity shortage, habitat destruction, and toxic waste (Crutzen, 2002a, 2002b; WWF, 2014; Shrivastava, 1995). Not only are the earths' non-renewable resources finite, but the depletion of renewable resources is now one of the greatest threats to sustainable development (Hart, 1997, p. 69).

The human race is dependent on the earth's depleting natural resources such as water, fish, arable land and wood for its survival (WWF, 2014). The *Living Planet Report 2012* explains that currently human beings consume 50% more resources than the earth can provide. This means that by 2030, the human race will need more than two planets to support its inhabitants' current way of living. The continuous decline in biodiversity is illustrated by the 2.7 million people around the world have to cope with water scarcity (WWF, 2012, p. 7).

The WWF (2014), measures the *Ecological Footprint* of the human population in terms of the area (in hectares) required to supply the ecological goods and services that it uses. Because of the earth's growing population, "humanity currently needs the regenerative capacity of 1.5 Earths to provide the ecological goods and services we use each year" (WWF, 2014).

The effects of the pressures put on the planet are explained in the *Living Planet Report 2014* (WWF, 2014, p. 15) as follows:

> Globally, habitat loss and degradation, exploitation and climate change are the main threats facing the world's biodiversity. They have contributed to a decline of 52 per cent in the Living Planet Index ® since 1970 – in other words,

> the number of mammals, birds, reptiles, amphibians and fish with which we share our planet has fallen by half.

An assessment done by the *Ecological Society of America* states that "environmental problems resulting from human activities have begun to threaten the sustainability of Earth's life support system." The assessment also identifies that the conservation, restoration and management of the earth's resources, is one of the most urgent challenges humanity is facing (Lubchenco *et al*., 1991; Lubchenco, 1998; WWF, 2014). In 1973, Schumacher already stated, "the global conscience has begun to notice that we are using up irreplaceable capital and precious non-renewable resources that nature provides us" (Schumacher, 1973, p. 6).

The ongoing environmental crisis facing humanity at large, forces society to question who is ultimately responsible for ensuring sustainable development. Nobel-prize winning atmospheric chemist, Paul Crutzen, emphasised human activities' increasing impact on the environment by referring to the current geological epoch as the 'Anthropocene' age (Crutzen, 2002a; Britt, 2008). The term Anthropocene is derived from the Greek term *anthropos* meaning human set in combination with *cene* as the standard suffix for "epoch" in geologic time. The Anthropocene is based on "overwhelming global evidence that atmospheric, geologic, hydrologic, biospheric and other earth system processes are now altered by humans" (http://www.anthropocene.info/). This affirms the significantly important negative role that human behaviour played in bringing about the ongoing environmental crises. Hence, it can be argued that every individual should take responsibility for his or her own behaviour and the manner in which they contribute to protecting the environment.

The Creation narrative, believed by a large part of the human population, follows the Christian Biblical view. In Genesis 1:26, God says, "Let us make mankind in our image, in our likeness, so that they may rule over the fish in the sea and the birds in the sky, over the livestock and all the wild animals, and over all the creatures that move along the ground" (International Bible Society, 1996). Christians believe that God has given man the authority and power to rule and reign over the earth and everything in it. However, as the saying goes, "With great power comes great responsibility." This responsibility also applies to organisations and working man.

Considering the major role that organisations play in society, organisations have a social responsibility to care for the environment and to ensure that it is not harmed. This responsibility of caring for the environment has to be transferred to working man. The behaviour of individual employees in an organisation collectively contributes to the environmental performance of that organisation (in terms of the TBL).

Unfortunately, working man is currently not performing in a way that ensures a sustainable future for future generations. Ones, Wiernik, Dilchert and Klein (2015) argue that businesses

and economic activities have the biggest impact on the depletion of the earth's natural resources, loss in biodiversity, water use, land use and greenhouse gas emissions. The rise of mass production, industrialisation, and technology expansion has long-term consequences on the environment and can be dangerously damaging to the earth's ecosystem (Crutzen, 2002a).

Due to the urgency of current environmental factors resulting from climate change, it is evident that the human race cannot carry on with its past behaviour, without considering the impact of its actions on the environment. Organisations can no longer simply focus on their *people* and *profit* performance. This environmental crisis has left both organisations and individuals no choice, but to reflect on their actions and its effect on the *planet* and to change their behaviour accordingly. Caring for our planet and ensuring a sustainable environment should be seen as the collective responsibility of the earth's human inhabitants.

The United Nation's 21st Conference of Parties (COP21) that took place in Paris in December 2015 is evidence of this reflection. At COP21, 195 countries gathered to adopt a universal, legally binding global climate deal to limit global warming to below 2ºC. To comply with this agreement and to ensure that the COP21 goals are reached, drastic behavioural changes need to take place. Most of the experts consulted and politicians who took part in the negotiations concluded that the most viable solutions lie in the actions of individuals.

Organisations need to ensure that they do not damage the environment and steer clear from polluting and overexploiting resources. Kok and Alkemade (2014) explain the necessity of the key actors in supply chains, like retailers and processing companies, giving more attention to biodiversity initiatives. These actors hold a vital position in influencing both production and consumption, which is important for making these efforts more effective. According to Lubchenco (1991), it is the responsibility of citizens, policy-makers, resource-managers, governments, business leaders and managers, and industry to make decisions concerning the earth's resources. Bansal and Roth (2000, p. 728), describe the term *ecological responsibility* as "a motivation that stems from the concern that a firm has for its social obligations and values."

Due to the social pressure put on companies by society, many companies have started to develop environmental management strategies. In 1997, Hart observed that many companies have started to accept their responsibility to do no harm to the environment and to minimise their negative impact on the environment. In some nations, there is an increasing trend where many companies are 'going green' (Rădulescu, Ioan & Năstase, 2016). These companies go 'green' because they realise that they can care for the environment by reducing pollution and simultaneously increase their profits.

Today, many companies are engaging in 'green' ways of doing business as they view environmentally-friendly practices as a viable marketing and business strategy (Raska & Shaw, 2012). Companies have already started by 'greening' their products and operations, and they often use these 'greening' initiatives as a focal point in their marketing efforts. Companies tend to find that when they 'go green', it could have a positive reflection on, and improve their public and brand image (Rădulescu *et al*., 2016).

The majority of previous research focuses on the explicit factors and systems in the pursuit to implement environmental management in organisations to protect the planet (Boiral, 2009). Organisations need to approach environmental issues in a holistic manner. These formal strategies and policies can be seen as useless if organisations discard the importance of human behaviour and the impact that employees' behaviour have on the organisations' performance. Organisational efforts and environmental initiatives will not be implemented successfully if employees are not committed to perform sufficiently.

Bansal and Roth (2000, p. 731), state that individual concern for the natural environment is "the degree to which organisational members value the environment and the degree of discretion they possess to act on their environmental values." For organisations to be successful in attaining environmental performance (in terms of the TBL), organisations need to have environmental sustainability as an organisational goal. Ecological concern should ideally trickle down throughout the whole organisation. Although organisations should formally acknowledge their commitment to environmentally responsible and sustainable business operation by formally setting up and running an organisational function specifically tasked with the ecological footprint of the organisation, this responsibility cannot be exclusively delegated to a single department. Only when the sense of environmental concern and responsibility is shared and tangibly demonstrated by every employee in an organisation, will employees start to value environmental sustainability and this will become part of the organisation's culture.

In order for a company to successfully support environmental sustainability, the entire company needs to behave in a manner that is environmentally-friendly, inferring that every employee's behaviour should be 'green'. The importance of environmental sustainability requires organisation-wide involvement in green behaviour from all employees. Ones and Dilchert (2012a) emphasise the importance of getting employees on all levels in the organisation on board and involved in the promotion of environmental sustainability. Organisations can only effectively contribute to achieving environmental sustainability if all their employees are on board. Individual actions will play a vital role in how successful an organisation will be in achieving environmental sustainability (Ones *et al*., 2015, p. 87). These employees' actions and behaviour have to jointly contribute to the organisation's performance.

The isolated voluntary and discretionary behaviours of a select few individual employees will have a rather small effect on the environmental performance of an organisation, compared to the collective behaviour of all employees in an organisation (Boiral, 2009).

Most scholars agree that in order to realise the ideal that environmental responsibility is shared and tangibly demonstrated by every employee in the organisation; employees' green behaviour should be formally managed (Paille´, Mejı´a-Morelos, Marche´-Paille´, Chen & Chen, 2015, p. 1)[2]. To achieve this, EGB should be seen as part of the individual employees' performance construct. More specifically the performance construct should be defined so as to include EGB as a latent behavioural competency (Bartram, 2005) and so as to include specific latent green outcomes that individual employees are held responsible for EGB. Once EGB becomes a formal part of the organisation's understanding of what it means to be a successful employee it becomes the responsibility of line management and the HR function to monitor and develop this performance dimension. Shrivastava (1995) emphasises that it is the organisation's role to contribute to sustainable development through educating, training, and motivating their employees to conduct their activities in an environmentally responsible manner. HR departments in organisations can play a critical role in developing sustainability and contributing to a greener planet.

The level of success that organisations achieve on all three of the TBL criteria depends significantly on the performance of its employees. Organisations are constituted-, run-, and managed by people. Organisational effectiveness is determined by the degree to which its human capital is well managed and utilised. Schneider (1987, p. 438) hypothesises that organisations are a "function of persons behaving in them". He summarises that "organizations are the people in them: that the people make the place" (Schneider, 1987, p. 450). Hence, an organisation's success in terms of the TBL is the function of employee performance.

It is HR's role to optimise employees' performance and add value to organisations. HR attempts to enhance employee performance through stock and flow interventions (Milkovich, Boudreau & Milkovich, 2008) that target the specific malleable and non-malleable person-centred and situational determinants of performance. Wright, Gardner and Moynihan (2003, p. 25) propose that:

> HR practices have a direct impact on employee skills, motivation, job design and work structures. These variables elicit certain levels of creativity, productivity and discretionary effort, which subsequently translate into improved operating performance. This has an impact on profitability and growth, which in turn have a direct impact on the firm's market valuation.

[2] It is however acknowledged that everybody does not share this position.

This supports the argument that the HR function affects organisational performance interpreted in terms of the TBL by affecting critical employee characteristics and situational characteristics through an array of HR interventions that in turn affect employee performance. In terms of the preceding argument, employee performance should be interpreted to include EGB. The argument is therefore that HR interventions should contribute to the planet dimension of the TBL by affecting the level of competence that employees display on the EGB performance dimension.

To manage employees and optimise performance, a discipline like Industrial and Organisational Psychology is needed to understand performance and its determinants. Knowledge is required to launch HR interventions, as organisations make use of knowledge and expertise to enhance performance.

According to Theron (personal communication, February 29, 2016), the behaviour of the working man[3] is not "a random walk through the work place." Rather, the behaviour of the working man is "the result of the lawful working of a set of determining factors characterising the individual and the context in which the behaviour occurs" (Theron, 2016a). This implies that nothing in the working man's behaviour occurs due to chance. Determinism implies that "in principle everything that happens can be explained as following from states of the world at earlier time" (Hoefer, 2016). This idea of determinism that everything can, in principle, be explained and that everything has a sufficient reason for being; implies that the nomological net of latent variables that determine the level of competence that employees achieve on the EGB performance dimension can in principle be described.

HR interventions in organisations aimed at enhancing EGB in a manner that contributes to the TBL will succeed to the extent that the nomological net of latent variables underpinning EGB (as a performance dimension) is validly understood. In order for HR to effectively manage EGB, it is essential to gain an in-depth valid understanding of the nature of the EGB construct and of the nature of the psychological mechanism that regulates the level of competence that employees display on the EGB competency. Valid insight in the nomological net of latent variables underpinning EGB will inform HR interventions aimed at influencing the level of competence that employees display on the EGB competency. The following questions therefore need to be asked to set a research process in motion that will start to unlock some of this insight in the nomological net of latent variables underpinning the EGB construct:

1. Why do employees differ in the extent to which they behave green?

[3] The phrase working man is used here as a gender neutral term to refer to any member of the species homo sapiens or to all the members of this species collectively.

2. Why do employees differ in the degree to which they display EGB at work?

Various sources (Ones *et al.,* 2015; Temminck, Mearns & Fruhen, 2015; Paillé & Boiral, 2013; Paille´ *et al*., 2015) have already provided valuable theorisation that conceptualises EGB and that identifies various determinants of EGB. However, the research thus far primarily focused on loose ideas to make sense of the construct of EGB. These loose ideas all make sense individually but fail to explain the psychological mechanism that regulates the levels of the dimensions of EGB as a whole.

Ones *et al.* (2015) offers valuable theorising that to some degree lays the foundation for the current study. Although the current study is strongly influenced by the pioneering work of Ones and Dilchert (2012a) and Ones *et al*. (2015); it does not regard itself bound to their definition of EGB nor bound to limit the proposed explanatory EGB structural model to the ideas and findings of Ones *et al.* (2015).

Past theorising generally did not lead to any formal structural model to explain variance in EGB as a latent variable. Nevertheless, Bamberg and Möser (2007) have developed and tested a comprehensive meta-analytic structural equation model (MASEM[4]) of pro-environmental behaviour (PEB), which is based on Hines, Hungerford, and Tomera's 1986/1987 meta-analytical study of environmental behaviour. Notwithstanding the usefulness and value of Bamberg and Möser's (2007) MASEM of PEB; their model has not been empirically tested by collecting new data. Moreover, these two studies are based on PEB in general and do not refer to the workplace/ employee behaviour. The study definitely offers a rather solid foundation for future research on EGB and plays an influential role in the development of the model proposed in this study. Thus, given the need to empirically test Bamberg and Möser's (2007) MASEM of PEB, a new EGB structural model will be developed to be empirically tested on newly collected data.

Given the complexity and rich interconnectedness of the nomological net that determines the level of green behaviour that employees display, understanding of this phenomenon lies in the whole of the nomological net. Hence, it is critically important to merge these loose ideas and variables in a structural model to illustrate the structure of the psychological mechanism that regulates the levels of EGB across employees and organisations so as to understand how they fit together and structurally interconnect. Consequently, this study will venture to develop and test an explanatory structural model so as to gain a comprehensive understanding of the

[4] Meta-analytic structural equation modelling (MASEM) combines the procedure of meta-analysis across large number of studies with structural equation modelling for the purpose of synthesising correlation or covariance matrices and fitting structural models on the pooled correlation or covariance matrix (Cheung, 2015).

situational and person-centred determinants of EGB and how they structurally combine as a whole to affect EGB. Considering Bamberg and Möser's (2007) MASEM of PEB, the research-initiating question proposed in this study can be seen as a second-generation research study[5].

1.2. THE RESEARCH INITIATING QUESTION

Therefore, the theorising in the literature study will be guided by the research-initiating question, why employees differ in the level of competence that they display on the EGB performance dimension. More specifically the second-generation research-initiating question asks the question why there is variance in the EGB competency of employees given the latent variables included in the Bamberg and Möser (2007) PEB MASEM. The research-initiating question is deliberately stated as an open-ended question. The intention of having an open-ended question is to allow the formulation of the research problem and research hypotheses through the process of theorising in Chapter 2 in a manner that acknowledges the complexity of the topic. Instead of ring-fencing various latent variables and their relationships with each other at the start of the research study, latent variables now have to earn their inclusion in the study through the process of theorising in the research study.

1.3. THE RESEARCH OBJECTIVES

The objectives of the research study are:

- To develop an explanatory structural model that will explain variance in EGB.
- To empirically test the fit of the explanatory EGB structural model by first testing the measurement model and thereafter the comprehensive LISREL model.
- To evaluate the significance of the hypothesised paths in the proposed EGB structural model.
- To derive managerial recommendations on how to influence EGB.

1.4. OVERVIEW OF THE STUDY

The rest of the research study is structured as follows. The research study presents the literature study in Chapter 2, which theorises to present a convincing argument to answer the research-initiating question. An explanatory EGB structural model is developed in this chapter. The research methodology in Chapter 3 argues the research methodology that will be used to empirically evaluate the explanatory structural model. Chapter 4 evaluates the ethical risks associated with the research. The results of the empirical testing of the prosed EGB structural model are discussed in Chapter 5. Conclusions, derived from the results, recommendations for future research, and managerial implications are discussed in Chapter 6.

[5] Although strictly speaking one can argue that it should not be seen as a second-generation study as no empirically tested explanatory structural model of EGB could be found.

CHAPTER 2
LITERATURE REVIEW

"Climate change is real. It is happening right now. It's the most urgent threat facing our entire species. We need to work collectively together and stop procrastinating… Let us not take this planet for granted, I do not take tonight for granted."
-Leonardo DiCaprio, Oscar's speech, 2016

2.1. INTRODUCTION

In the introduction is has been argued that EGB is behaviour that is beneficial for the organisation, planet and the next generation. It was moreover argued that it is crucial that EGB should be displayed throughout the entire company. It is not only organisations that behave in a manner that promote environmental sustainability, but also the behaviour of the individual employees in organisations that determines the organisations' environmental performance (Ones *et al*., 2015). Given the argument in the introductory chapter on the necessity that green behaviour should be displayed by all employees, it can be argued that EGB should not be reserved for select employees alone. For a company to be effectively 'green' and to contribute to sustainable development, green behaviour has to be diffused throughout the entire company on all levels. Green practices should not only be supported by management but should also be supported in word and deed by all employees. Considering that every employee plays a key role in ensuring that organisations achieve environmental sustainability, it is the responsibility of individual employees to integrate these ecological concerns into their daily activities and work tasks (Boiral, 2002, p. 291). Therefore, to prevent harm to the environment and to increase environmental sustainability, there needs to be a conscious and explicit attempt from HR to enhance EGB as a formal performance dimension through an integrated array of HR interventions.

In order for these HR interventions to be effective and to have employees successfully integrate EGB in their everyday activities, a valid understanding of the person characteristics and situational characteristics that determine the level of competence that employees achieve on the EGB competency and the manner in which these latent characteristics structurally combine to regulate the level of competence is required. The broad objective of the study is therefore to investigate why employees differ in the level of competence that they display on the EGB competency. The aim of the literature study is to define EGB and to explore the other latent variables that are structurally related to each other and to EGB (Theron, 2016c). This chapter will develop an overarching substantive research hypothesis as an answer to the second-generation research-initiating question, derived via the introductory argument in Chapter 1, through theorising based on logic and previously published research. The second-generation research-initiating question asks the question why there is variance in the EGB

competency of employees given the latent variables included in the Bamberg and Möser (2007) explanatory psychological ownership structural model. The research-initiating question of the current research study is therefore what other latent variables, besides those identified by Bamberg and Möser (2007) should be incorporated in the EGB structural model and which latent variables and/or paths currently included in the model should be deleted? No commitment was made in the introductory argument as how the Bamberg and Möser (2007) model should be modified and/or elaborated. This was done on purpose. The substantive research hypothesis should emerge from focused but unbridled theorising in response to the research-initiating question. The substantive research hypothesis should not guide the literature study. That would make the literature study essentially redundant. The overarching substantive research hypothesis will describe the nature of the extended psychological mechanism that is postulated to regulate the level of competence that employees achieve on the EGB performance dimension.

2.2. THE BAMBERG AND MÖSER'S (2007) MASEM OF PEB

Blok *et al*. (2015) investigates the factors affecting EGB[6]. The study distinguishes between internal and external factors that predict PEB in the workplace, and tests the model among employees of a green university. This is one of the most cited theories in the study of the behaviour of working man and environmental studies and is grounded in the theory of planned behaviour (TPB). The Blok *et al*. (2015) study concludes that whilst TPB is a sufficient theory to help explain PEB, it cannot be viewed as the sole explanation for PEB in the workplace. Blok *et al.* (2015), suggest that other factors should also be taken into account to explain PEB in the workplace comprehensively.

In their study on PEB[7], Bamberg and Möser (2007) also applies the TPB to gain a comprehensive understanding of what motivates and determines PEB. As seen in Figure 2.1., the comprehensive MASEM illustrates the structural relations between eight different determinants of PEB.

[6] Blok *et al*. (2015) preferred to use the term PEB rather than EGB. The current study, however, prefers the term EGB.
[7] Bamberg and Möser (2007) likewise preferred the term PEB, as their study did not specifically focus on employee behaviour.

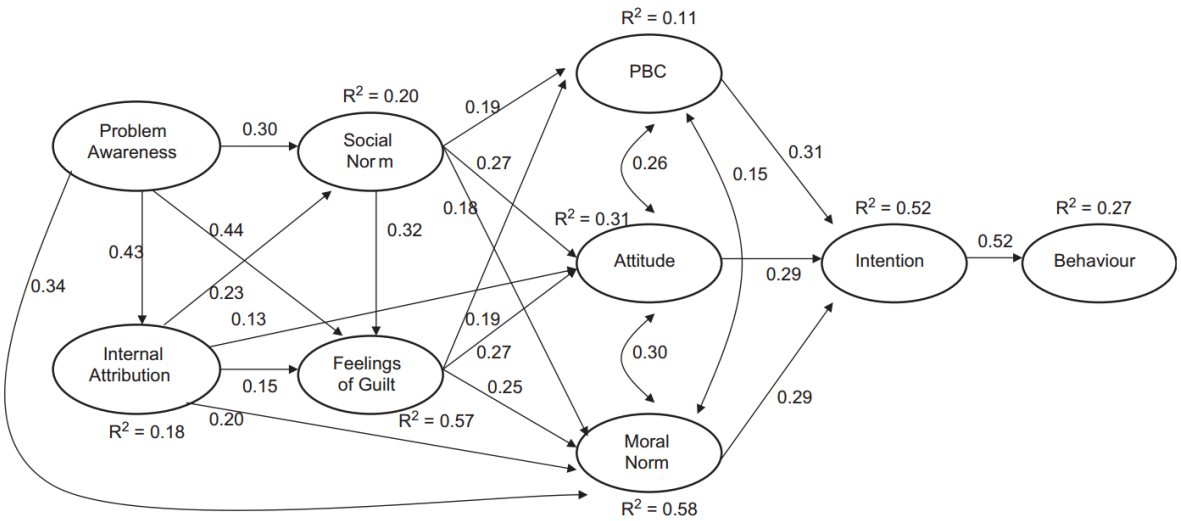


Figure 2.1. **MASEM of pro-environmental behaviour**

(Bamberg & Möser, 2007, p. 16)

Bamberg and Möser's (2007) study is based on Hines *et al.'s* (1986, 1987) meta-analytical study of responsible environmental behaviour. It should be explicitly noted that Bamberg and Möser's (2007) model is not focussed specifically on employee green behaviour but on the responsible environmental behaviour of citizens in general. This new study is conducted by integrating the technique of SEM and meta-analysis (MASEM) to test their model fit. The aim of the MASEM is to aggregate data in terms of newer studies that propose the same relationships between variables in order to replicate the original results from the Hines' *et al*. (1986, 1987) meta-analytic study (Bamberg & Möser, 2007; Hines *et al*., 1986, 1987). According to Bamberg and Möser (2007, p. 15), the aim of the MASEM is "to perform a meta-analytical test of a theoretical model integrating eight psycho-social determinants of pro-environmental behaviour."

Bamberg and Möser (2007, p. 20), interpret their MASEM data-model fit as follows: "for assessing data-model fit, the correspondence between model implied and the actual pooled correlation matrix can be judged as acceptable (x^2= 148.54; df= 14, p<.001; *RMSEA*= .089; *CFI*= .98; *SRMR*= .039)." The results of this meta-analytic study indicate that 27% of the variance in PEB can be explained by intention. The study also finds that 52% of variance in intention can be explained by PBC, attitude, and moral norm. Bamberg and Möser (2007) confirm that social norm, feelings of guilt, problem awareness, and internal attribution, explain 58% of variance in moral norm.

Unfortunately, it appears that the article (Bamberg & Möser, 2007) does not report the significance of the gamma and beta path coefficient estimates. Consequently, this prevents the opportunity to interpret the statistical significance of the hypothesised relationships

between variables. Despite the fact that the model fit is less favourable than the authors claim, the proposed MASEM of PEB nonetheless offers a sound foundation and basis for further research on EGB.

2.3. CONCEPTUALISING EMPLOYEE GREEN BEHAVIOUR

2.3.1. In-role versus Extra-role Behaviour

It is the current study's view is that EGB should be recognised as a formal performance dimension that forms part of the formal job script. Ramus and Killmer (2007) observe that organisational behaviour can be either *in-role* (role prescribed) or *extra-role* (supra-role) behaviours. Researchers often ask the question of whether EGB should be seen as in-role or extra-role behaviour, and then either follows only one school of thought or acknowledges both interpretations (Norton, Parker, Zacher & Ashkanasy, 2015).

Ones *et al.* (2015) fail to choose sides in this debate, as they hold the view that EGB can either be discretionary or required (Norton *et al.,* 2015). Ones and Dilchert (2012a) also fail to explicitly specify whether EGB should be seen as part of employees' formal job duties and responsibilities, or as discretionary extra-role behaviours. Similar concepts that are often used interchangeably with EGB are PEB in the workplace, organisational citizen behaviour (OCB) and OCB-E (OCB that is directed towards the environment). Paillé and Boiral (2013) and Stritch and Christensen (2016) view EGB, OCBE and PEB in the workplace as extra-role behaviour.

Extra-role behaviours refer to behaviour that is separate from, and beyond the task performance, job duties and responsibilities that employees are held accountable for (Miles, Borman, Spector & Fox, 2002). Various researchers claim that EGB, as well as PEB in the workplace (directed at the organisation or the environment), are extra-role behaviours that can be described as voluntary, discretionary behaviours that transcend the basic job requirements (Ramus & Killmer, 2007; Paillé & Boiral, 2013; Stritch & Christensen, 2016). Some researchers (Ones & Dilchert, 2012a; Paillé & Boiral, 2013) advocate that in traditional, non-green jobs, all EGBs are seen as extra-role behaviours when they are voluntary. Ones and Dilchert (2012a), and Paillé and Boiral (2013) claim that green behaviours are only seen as in-role when they are a fundamental part of green jobs and are required in terms of the specific job duties.

The current study questions the above held views and would advocate the inverse. Given the argument in Chapter 1 concerning the current environmental crisis, organisations can no longer afford the luxury of defining EGB as a 'nice-to-have', optional extra-role behaviour that is voluntary and discretionary. Given the importance of an organisations' environmental performance and the key role of green behaviour in companies, there is really no option but

to argue that EGB should be classified as an in-role behaviour that is expected and required from all employees. Once organisations view EGB as a performance dimension, it becomes one of the aspects of employee performance that is monitored and developed. It would undeniably be ideal if no interventions were required to ensure that individual employees throughout the organisation display EGB and that green behaviour in the workplace would appear as a voluntary, discretionary behaviour, but this is unfortunately not sufficiently often the case.

Considering the complexity of human behaviour, employees differ in the extent to which they behave and act green in the workplace (as some employees are greener than others are). Some employees could already have the requisite level of EGB motivation to provoke green behaviour and will voluntary and spontaneously behave in an environmentally-friendly manner. While on the contrary, other employees might not share this motivation and will only behave in a green/environmentally-friendly manner if it is prescribed as a part of their job and organisational script. Consequently, for all employees to perform at least adequately on this dimension, in-role EGB needs to be scripted as it is seen as a required performance dimension.

Even though EGB is identified as in-role required behaviour, the current study recognises that spontaneous, voluntary, natural intrinsically motivated green behaviour will still appear. To some extent, EGB will also manifest as discretionary behaviour, as not all EGB can always be scripted. No script is ever perfect or complete, as a script cannot possibly cover all behavioural aspects that would be appropriate and beneficial in all possible scenarios.

Even though certain green behaviours are not scripted or prescribed, employees are still expected to behave in a manner that contributes to and is in the interest of the organisation, other individuals and the environment. This line of reasoning suggests that OCB in general should itself be a formal performance dimension. According to Myburgh and Theron (2014, p. 36) organisations expect employees to:

> display ‘organisational citizenship behaviour’ that facilitates the ‘task performance’ of co-workers, facilitates the task of the leader and benefits the organisation. The role the employee is meant to play in the organisation cannot be completely scripted. ‘Organisational citizenship behaviour’ refers to all constructive non-prescribed activities that benefit the organisation and its members.

Consequently, this study holds the position that green behaviour in the workplace should be required and expected from all employees. To the extent that EGB is required and prescribed to employees, it is no longer seen as extra-role behaviour. Even though the study recognises

EGB as in-role, employees are still expected to behave in a manner that goes beyond their script (i.e. display OCB). Such OCB could then include green discretionary behaviour.

Organisations should first and foremost view EGB as in-role behaviour that is required from all employees across all jobs, industries and organisations; not just in green jobs. If we expect employees to behave green in the workplace, EGB should be seen as a prescribed and expected behavioural performance dimension. Thus, EGB should be seen as a performance dimension that should be formally recognised, appraised, developed and rewarded to encourage employees to engage in EGB.

2.3.2. Employee Green Behaviour as a Performance Dimension

Job performance is generally interpreted to refer to individual employees' actions and behaviours (Viswesvaran & Ones, 2000). There are, however, others who rather interpret performance in terms of the outcomes that are achieved through the behaviour than the behaviour itself (Bartram, 2005; Bernardin & Beatty, 1984). Nevertheless, to gain a theoretical understanding of performance, both Campbell's and Bartram's positions should be considered to gain an understanding of how they relate. As cited in Bartram (2005, p. 1186), Campbell (1990, p. 704) defines performance as:

> Performance is behavior. It is something that people do and is reflected in the actions that people take. … .Performance is not the consequence(s) or result(s) of action; it is the action itself. … . For any job, there are a number of major performance components, distinguishable in terms of their determinants and covariation patterns with other variables. The correlations among their true scores are less than one.

Campbell (1990) views performance as behaviour or action in itself, not an outcome or consequence of the behaviour. Ones and Dilchert (2012a; 2012b) agree with Campbell (1990) and Viswesvaran and Ones (2000) in defining EGB as an action, not an outcome of the behaviour. On the other hand, Bartram (2005) and Bernardin and Beatty (1984) stress that Campbell fails to sufficiently acknowledge that behaviour is instrumental in achieving outcomes. According to Bernardin and Beatty (1984), performance refers to the "record of outcomes produced on a specific job function or activity during a specified time period" (Visveswaran & Ones, 2000, p. 222).

Myburgh (2013), in contrast to the preceding authors, claims that successful performance requires the appropriate behaviour that will lead to the required outcomes. Myburgh (2013, p. 20) interprets performance as "a construct that encompasses both a behavioural domain as well as an outcome domain and that the content of these two domains are structurally inter-related." For the purpose of this study, performance is interpreted as an interrelated set of behaviours and outcomes. The current study therefore proposes that green behaviours should

result in various outcomes. In the final analysis, EGB is required from employees because they are instrumental in achieving specific outcomes that are of importance to the organisation, society and the planet's long-term survival.

Furthermore, Viswesvaran and Ones (2000) distinguish between three broad dimensions of job performance, namely task performance, OCB and counterproductive work behaviour (CWB). Ones and Dilchert (2012a, pp. 107-108) contend that "EGB can *fall into* different job performance domains. They can be *part of* task performance, organizational citizenship behaviors, or even counterproductive work behaviors." Likewise, Ones and Dilchert (2012b) argue that EGB constitute part of employees' *task performance* if these behaviours are required as part of employees' formal job duties and responsibilities. Conversely, if these behaviours are seen as discretionary and volitional, they are seen as a subcategory of *OCB*/OCBE (Ones & Dilchert, 2012b). However, this study differs from Ones and Dilchert (2012a), as it contends that EGB should be seen as an additional, separate performance dimension and not merely as the behavioural expression of task performance, OCB or CWB in a specific context. The current study does however, not deny that in green industries task performance would encompass to some degree green behaviour and that even in non-green industries where green behaviour is formally seen as a separate performance dimension, employees can still display green behaviour that goes beyond that which is formally scripted.

As previously mentioned, EGB is valuable to organisations as it contributes to an organisation's environmental performance. If EGB is seen as a distinct, formal performance dimension, it is something that should be measured, monitored, and influenced. If environmental sustainability is seen as an organisational goal, the extent to which employees contribute to this goal should be seen as a performance dimension. This study therefore proposes that EGB be added as an *additional* generic performance dimension that should be recognised as a separate behavioural category.

Since EGB is seen as a performance dimension, organisations should develop HR interventions to manage and optimise employees' green behaviour performance. If EGB is not purposefully managed, it will be limited to a select few employees that display it as OCBE. To effectively alter the performance of employees requires a valid understanding of what determines this performance in a specific task/ job and a detailed understanding of the task/job that the employee is meant to perform (Theron, 2016b). To develop and test an explanatory EGB hypothesis the construct of EGB needs to be conceptualised and constitutively defined. In order to measure EGB so as to manage it, the construct of EGB also needs to be conceptualised and constitutively defined.

2.3.3. Defining Employee Green Behaviour

The majority of research studies focus on general green behaviour (also referred to as pro-social behaviour[8], PEB, eco-friendly behaviour, eco-initiatives, etc.), instead of *employee* green behaviours. For example, Bamberg and Möser (2007, p. 15) define PEB as:

> behaviour that is probably best viewed as a mixture of self-interest (e.g., to pursue a strategy that minimises one's own health risk) and of concern for other people, the next generation, other species, or whole ecosystems (e.g., preventing air pollution that may cause risks for others' health and/or the global climate).

Various researchers have developed different terms when referring to the same or similar types of green behaviour that in this study is referred to as EGB. This study would define EGB as a behavioural (or performance) construct on which individuals differ. Moreover, EGB refers to the extent to which employees behave green in the workplace and the current study concurs with Ones and Dilchert's (2012a, p. 87) definition of EGB as "scalable actions and behaviours that employees engage in that are linked with and contribute to or detract from environmental sustainability." The current study would, however, in addition argue that to obtain a comprehensive understanding of that which constitutes employee green performance, the outcomes that the actions and behaviours are instrumental in achieving, and that the organisations expects the employee to contribute towards, should also be made explicit.

Although Ones and Dilchert (2012a, p. 87) define EGB as behaviour that can '*detract from* environmental sustainability', this study rejects this part of the definition. It is important to mention that this study interprets EGB as a construct that lies on a continuum from null (neutral) to positive. The manner in which EGB is conceptualised focuses on green, environmental *friendly*, *pro*-environmental behaviour that contributes to, cares for, and has a positive impact on the environment. EGB is seen as positive behaviour that is measured in terms of its intensity. The EGB structural model views and measures EGB as a behaviour/ construct that lies on a uni-polar continuum (the extent to which employees engage in positive EGB).

Nevertheless, this study acknowledges the danger of solely focussing on the positive dimension of the construct and denying the pathological negative form that it could take. Similar to the definition of psychopathology and pathology, which only focuses on the construct's negative dimension (disease/disorder/illness), non-green employee behaviour is seen as the negative dimension/reverse of EGB. Opposite to the definition of EGB, non-green employee behaviour refers to the negative aspects of employee behaviour towards the environment (e.g. harming the environment) and lies on a continuum from null (neutral) to

[8] It is acknowledged that pro-social behaviour is probably a more extensive construct that includes green behaviour but that is not restricted to it.

negative. When employees act in opposition to the environment, they engage in *unfriendly, non*-environmental, *non-green* employee behaviour. Hence, non-green employee behaviour is seen as another separate construct and should be measured as such.

Ones and Dilchert (2012a) point out that EGB is behaviour and actions that are under the control of employees; employees are thus responsible for their own behaviour in the workplace. This definition implies that EGB is a performance construct that manifests itself in displayed behaviour, indicating that EGB as a construct is measurable via these behavioural denotations. Furthermore, Dilchert and Ones (2012a) state that EGB is not only applicable to certain green companies, or to specific green jobs or occupations. The current study concurs with this position.

Traditionally, the most well-known PEB are usually the 3Rs, namely: Reuse, Recycle, and Reduce (Ones & Dilchert, 2012a)[9]. Reuse refers to using resources after it has already been used, as opposed to using something for the first time or disposing something after usage. An example of this would be reusing disposable products and material. Recycling refers to a conversion of resources/materials into something that can be used again, for the same or another purpose. Recycling paper, cardboard, cans, glass, plastic, etc. are all examples of materials commonly recycled. Reducing involves reducing and minimising the use of resources, for example, reducing the use of electricity or water (Ones & Dilchert, 2012a). Despite the fact that the 3Rs are important examples of environmentally friendly behaviour in general, they do not recognise or include all types of PEB and fail to acknowledge PEB in the workplace. Ones and Dilchert (2012a) contend that EGB extends far beyond the 3Rs and that the 3Rs are just three specific examples of a substantially larger number of first-order EGB factors.

In describing EGB, Ones and Dilchert (2012a) view the 3Rs as first-order behaviours that fall under one of the five second-order EGB categories, namely Conserving. According to Dilchert and Ones (2012b), a taxonomy of EGB is vital in understanding, modelling, modifying and managing employees' green behaviour and actions. Ones and Dilchert (2012a, p. 90) more specifically propose that the taxonomy of EGB should classify green behaviours into different homogenous clusters that can be portrayed as first-order factors in a hierarchical model. Ones and Dilchert (2012a) also suggest that a single third-order factor, 'general green performance', should sit at the top of the hierarchy of EGB. This term is coined by them to refer to overall general environmental sustainability performance at the individual employee level. The

[9] Some have suggested that the 3Rs can be expanded to 5Rs, namely Refuse, Reuse, Recycle, Reduce and Rot.

dimensions of EGB, as proposed by Ones and Dilchert (2012a), will subsequently be discussed in more detail.

2.3.4. Employee Green Behaviour Dimensions

Ones and Dilchert (2012a) identify various determinants of behaviour, i.e. knowledge, values, awareness, attitude, beliefs, organisational culture and other characteristics. EGB is seen as a multidimensional construct that acknowledges the complexity of human behaviour. Ones and Dilchert (2012a, 2013) outline the components of EGB as a behavioural construct. The connotative meaning of the construct of EGB can be further explicated by breaking it up into dimensions that constitute it. Dilchert and Ones (2012b) discern sixteen first-order EGBs that load on five second-order EGB factors that constitute the Green Five taxonomy (Ones *et al*., 2015). The five second-order factors identified by Ones and Dilchert (2012a) are Working Sustainably, Avoiding Harm, Conserving, Influencing Others, and Taking Initiative. As a summary of Ones and Dilchert's (2012a) Green Five taxonomy, the identity of the first-order EGB factors and the manner in which they load on the second-order and third-order EGB factors, are shown in Table 2.1.

Table 2.1.

A Description of the hierarchical factor structure of the Employee Green Behaviour construct

First-order EGB factors	Second-order EGB factors	Third-order EGB factor
Changing how work is done Choosing responsible alternatives Creating sustainable products and processes Embracing innovation for sustainability	**Working Sustainably**: the extent to which the employee changes and adapts his/her behaviour to enhance sustainability	
Monitoring environmental impact Pollution	**Avoiding Harm**: the extent to which the employee acts to reduce the negative impact of organisational activities on the environment	
Strengthening ecosystems Recycling Reusing Reducing use Repurposing	**Conserving**: the extent to which the employee attempts to minimise waste with the aim of preserving resources	**General green performance**
Encouraging and supporting Educating and training for sustainability	**Influencing Others**: the extent to which the employee engages in social behaviour to influence the green behaviour of others	
Lobbying and activism Putting environmental interests first Initiating programs and policies	**Taking Initiative**: the extent to which the employee displays green entrepreneurial behaviour that involves personal risk and sacrifice.	

2.3.4.1. Working Sustainably

Working Sustainably, or transforming, refers to behaviour where employees change and adapt their behaviour to enhance sustainability. Ones and Dilchert (2012a) identify four first-order EGB factors that load onto the second-order factor Working Sustainably, namely: changing how work is done, choosing responsible alternatives, creating sustainable products and processes, and embracing innovation for sustainability. Designing environmentally friendly products, using eco-friendly natural ingredients in production, creating a more sustainable work process, are all possible incidents of Working Sustainably (Ones & Dilchert, 2012a).

2.3.4.2. Avoiding Harm

This second-order dimension of green behaviour involves employee behaviours aimed at reducing the negative impact of organisational activities on the environment. According to Ones and Dilchert (2012a), this category refers to employees' goal of maintaining a healthy and sustainable planet by preventing long-term environmental damage/harm. Three first-order EGB factors load on the second-order factor Avoiding Harm, namely preventing pollution, monitoring environmental impact, and strengthening ecosystems (Ones & Dilchert, 2012a). Furthermore, Ones *et al.* (2015) explain that this category involves responsibility and cautiousness with regards to an employees' own ecological footprint and behaviours that aim to recover or restore environmental damage. Some examples of Avoiding Harm are cleaning up after an accident and planting trees (Ones & Dilchert, 2012a).

2.3.4.3. Conserving

The second-order EGB factor, Conserving, has four first-order factors that load on it, namely reducing use, reusing, repurposing and recycling. According to Ones and Dilchert (2012a), Conserving refers to behaviour where employees attempt to minimise waste with the aim of preserving resources (like water, electricity, paper, etc.). Ones *et al*. (2015) associate this behavioural dimension with thriftiness and frugality. Ones and Dilchert (2012a) identify various examples of positive incidents of this dimension, for example, recycling (cans, paper), turning off lights, printing double-sided.

2.3.4.4. Influencing Others

Influencing Others indicates social behaviour that employees engage in to influence the green behaviour of others. This dimension also involves employees persuading others to behave green and/or gaining the required knowledge and skills to be more green. According to Ones and Dilchert (2012a), the two first-order factors that load on this second-order dimension are encouraging and supporting others, and educating and training for sustainability. Ones *et al*. (2015) elaborate that this dimension involves giving incentives, enabling and/or praising individuals that engage in EGBs. Influencing Others can refer to incidents where employees

train or educate others in green practices, correct someone who is behaving in an environmentally unfriendly manner, encouraging other employees to engage in EGB like forming a lift club to work (Ones & Dilchert, 2012a).

2.3.4.5. Taking Initiative

Taking Initiative refers to employee green entrepreneurial behaviour that involves personal risk and sacrifice (Ones & Dilchert, 2012a). Taking Initiative involves behaviour that goes against social norms as employees who engage in this green dimension are often identified as change agents. The three first-order EGB factors that load on the second-order taking initiative factor are putting environmental interests first, initiating programs and policies, and lobbying and activism (Ones & Dilchert, 2012a). Taking Initiative can manifest in various behavioural actions, such as campaigning against environmental unfriendly practices, pioneering an environmental program (Ones & Dilchert, 2012a).

2.2.4.6 Concluding Remarks

The fact that the Ones and Dilchert (2012a) conceptualisation of EGB makes provision of a single third-order EGB factor on which all five second-order EGB factors load implies that the five second-order EGB factors are conceptualised to be to some degree correlated and to share common variance. The current study adopts the Ones and Dilchert (2012a) conceptualisation of EGB as a five-dimensional construct. Although Ones and Dilchert's (2012a) taxonomy of EGB acknowledges both voluntary and required behaviour, the current study regards all of the first- and second-order EGB competencies as representing required behaviours.

Previous research (Dilchert & Ones, 2012b) tends to focus on the determinants of a specific EGB behavioural dimension, instead of investigating EGB as a comprehensive multidimensional competency or performance dimension. Ones and Dilchert (2012a) seem to support this trend since they highlight that performance in each of the dimensions will vary as a function of different determinants and processes that underlie each of these. They suggest HR interventions should be developed to enhance EGB by enhancing performance on each of the specific dimensions. This follows logically from their argument that the level of competence that employees reach on each of the five second-order EGB factors are distinctly determined. EGB therefore has to be enhanced as a broad behavioural construct by focussing interventions on all five EGB second-order factors. Employees' success in EGB depends on their performance on all of the dimensions. The ideal would therefore be to perform high on all of the EGB dimensions.

If individuals perform well in one dimension, they could possibly perform well in another dimension as well. In developing an explanatory EGB structural model the question therefore should be asked why this is the case. Do the dimensions affect each other? Are there structural relationships between them? Or do these second-order EGB factors correlate because they share the same determinants?

Bamberg and Möser's (2007) study on PEB predates the Ones and Dilchert (2012a) conceptualisation of EGB. Bamberg and Möser's (2007) model identifies PEB as a single latent variable. A question that the current study needs to consider is whether the single PEB latent variable in the Bamberg and Möser (2007) model should be dissected into five separate latent variables. Doing so would make sense if the Ones and Dilchert (2012a) position would be accepted that different determinants underpin employees' standing on each of the second-order EGB factors and if it is, moreover, assumed that causal relations exist between the second-order EGB factors. In as far as integrity would enhance employees' ability to influence colleagues, it could be argued that Working Sustainably, Avoiding Harm and Conserving could causally influence Influencing Others. This argument would however, have been more convincing if Influencing Others would have been constitutively defined as the extent to which the employee successfully engages in social behaviour to influence the green behaviour of others.

The position held by Ones and Dilchert (2012a) that performance in each of the second-order EGB factors vary as a function of different determinants and processes that underlie each of these EGB dimensions, moreover, does not preclude the possibility that some of the variance in the second-order factors have a common origin. The Bamberg and Möser (2007) model pivots on the premise that PEB is motivated behaviour. It seems reasonable to argue that the latent variables involved in the motivational process will directly influence all five second-order EGB factors. On the other hand, it then still remains true that the strength of the motivational force or the intention to exert effort towards each of the five second-order EGB competencies could differ. Based on these considerations the current study will also model EGB as a single (multi-dimensional) latent variable.

Even though this study identifies EGB as required in-role behaviour, past studies in this area have classified EGB as an extra-role behaviour (Ones & Dilchert, 2013). To understand why employees differ in their EGB, what motivates employees to engage in EGB, and what influences the five EGB dimensions; research concerning extra-role EGB will therefore also be analysed. Previous studies on general PEB and green behaviour, not necessary in the workplace, will also be considered and incorporated as this study builds on previous literature.

2.4. TOWARDS THE DEVELOPMENT OF AN EXPLANATORY EMPLOYEE GREEN BEHAVIOUR STRUCTURAL MODEL

The extent to which employees have knowledge and awareness of environmental problems, solutions, and possible green behavioural practices in the workplace, could motivate EGB. Various internal/personal aspects of employees, as well of environmental external (organisational) aspects should be taken into account in an attempt to gain insight into the complexity of EGB.

The theorising in Chapter 2 is based on the assumption that the behaviour of working man is complex and that understanding lies the whole. Accordingly, the literature study and the structural model attempts to construct and acknowledge that EGB is complexly determined. Based on the deterministic conviction, the variance that employees display in EGB is due to the interaction of a complex nomological network of person-centred and situational latent variables that have a direct and indirect influence on EGB (Theron, 2016b). To uncover the complexity of the nomological net of person-centred and situational latent variables that determine EGB, the theorising will set out from the assumption that EGB is volitional, motivated behaviour.

2.4.1. Motivation of Employee Green Behaviour

To understand why employees differ in the extent to which they display EGB, the motivation that drives this behaviour should be explored. Moreover, to understand variance in EGB and what determines this behaviour, the individual factors that motivate it and the organisational characteristics that support it should be understood holistically. Motivated behaviour is conscious, purposeful behaviour that is motivated to achieve something. Considering that EGB is motivated behaviour and that the working man has an abstract thinking ability, motivational theories are vital to gain insight into why employees differ in the extent to which they demonstrate and perform EGB.

It has been argued that employees differ in terms of their motivational strength to display EGB, or stated differently, in terms of the strength of their attitude towards displaying the behaviour. Thus, values drive/influence employees' motivational strength or attitude towards EGB via its influence on the valence/evaluation (e_i) component of attitude/motivational strength. It can therefore be hypothesised that the strength of EGB motivation is influenced by the valence of the expected outcomes of behaviour, for example, if the behavioural outcomes are generally evaluated as positive, and the likelihood/expectancy of attaining these outcomes (or the belief (b_i) component of attitudes). In terms of this line of reasoning, it therefore makes sense to start the construction of a psychological mechanism that is in principle capable of explaining the level of EGB competence that employees achieve by focusing on motivation as a pivotal

component of the mechanism. This is done by examining Vroom's expectancy theory (Van Eerde & Thierry, 1996), Fishbein and Ajzen's Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1977), and Ajzen's Theory of Planned Behaviour (TPB) (Ajzen, 1991; Ajzen, 2002).

In agreement with the TPB and the TRA, this study also holds the view that behavioural intent is the direct antecedent of behaviour. A meta-analytical study of general environmental behaviour of Klöckner (2013, p. 1034) found that behavioural intention is the strongest predictor of actual environmental behaviour. Scherbaum, Popovich and Finlinson (2008, p. 824) define the intention to behave as follows:

> Behavioral intention refers to an individual's intention to perform a behavior or a class of behaviors. The greater the intention, the more likely it is that the individual will perform the behavior assuming that there are no situational constraints on the behaviour.

For the purpose of this study, behaviour will be referred to as EGB, as previously defined by Ones and Dilchert (2012a). Intention is also identified as the **Intention to Act Green (IAG).** The IAG refers to employees' intention to engage in pro-environmental and green behaviour. Hypothesis 1 will be reserved for the overarching substantive research hypothesis in Chapter 3. Thus, beginning with Hypothesis 2, the following path-specific substantive research hypothesis is derived from Ajzen's TPB in response to the research-initiating question formulated in Chapter 1.

Hypothesis 2: In the proposed EGB structural model[10] it is hypothesised that IAG will positively affect EGB.

Expectancy Theory

Vroom's 1964 expectancy theory proposes that work motivation can be explained by the *valence, instrumentality* and *expectancy* (VIE) model (Van Eerde & Thierry, 1996). Van Eerde and Thierry (1996, p. 576) define valence as "all possible affective orientations toward outcomes, and it is interpreted as the importance, attractiveness, desirability, or anticipated satisfaction with outcomes." *Valence* can also be interpreted as the evaluation of the value and desirability attached to an outcome/reward. *Instrumentality* is seen as the probability of attaining an outcome/reward given the level of performance that had been achieved. This is also known as the performance-reward probability (Van Eerde & Thierry, 1996). *Expectancy* refers to the belief individuals hold as to how their effort will result in a certain level of performance. In terms of the expectancy theory of motivation, the motivational strength to

[10] The phrase in the proposed EGB structural model has been used on purpose to acknowledge that each hypothesis in effect states that the latent effect explains unique variance in the focal latent variable in a large model that hypotheses the focal latent variable to be affected by other latent variables in the model. The hypothesis therefore in effect claims that IAG will explain unique variance in EGB that is not explained by other effects in the model that are structurally linked to EGB.

display EGB (MS[EGB]) is determined by the multiplicative combination of the expectancy that effort (E) will result in successful EGB performance (P) (i.e. P[E→P]) and the valence of performance (Val[P]). The valence of performance in turn is determined by the multiplicative combination of the instrumentality of successful EGB performance in achieving k salient outcomes (i.e. $P[P \rightarrow O_i]$) and the valence of the outcomes ($Val[O_i]$). Therefore, the motivational strength to display EGB is given by:

$$MS[EGB] = P[E \rightarrow P]*Val[P]$$
$$= P[E \rightarrow P]*\Sigma P[P \rightarrow O_i]*Val[O_i];\ i = 1, 2, \ldots, k$$

In terms of the expectancy theory of motivation the intention to display EGB (Int[EGB])[11] would then be determined by the motivational strength to display EGB:

$$Int[EGB] = b_0 + b_1 MS[EGB]$$

Theory of Reasoned Action (TRA)

Fishbein and Ajzen's (1977) TRA extends the argument of the expectancy theory. The TRA acknowledges the role of motivation as antecedent of behavioural intention. The TRA conceptualises motivational strength as attitude strength. According to the TRA, the attitude towards the display of EGB (Att[EGB]) is determined by the multiplicative combination of the belief (b_i) that EGB will result in salient outcomes and the evaluation of these salient outcomes (e_i) as good or bad, summed over the k salient outcomes. Beliefs in the TRA essentially correspond to expectancies in the expectancy theory of motivation, whereas evaluations correspond to valences. The TRA therefore argues that:

$$Att[EGB] = \Sigma b_i * e_i;\ i = 1, 2, \ldots, k$$

The TRA, however, argues that IAG is not solely dependent on the employees' personal motivation, but it is also affected by the employees' perceptions of what salient others expect of the employee and the motivation of the employee to comply with this expectation. According to Ajzen (1991) subjective/social norm (SN[EGB]) is defined as perceived social pressure to engage or not engage in certain behaviours. In other words, the TRA recognises that behavioural intent is also determined by an individual's perception of salient other people's expectations and their motivation to comply with these expectations. Social pressure is created by the multiplicative combination of the normative belief (Nb_j) that group j, of p salient groups, expects green behaviour and the motivation to comply with the expectation of group j (Mc_j) summed over the p groups. The TRA therefore argues that:

[11] The intention to display EGB or the intention to act green refer to the same construct and have been represented with the abbreviations Int[EGB] and IAG.

$$SN[EGB] = \Sigma Nb_j{*}Mc_j;\ j = 1, 2, \ldots, p$$

The TRA therefore argues that the employees' intention to display EGB is linearly determined by the weighted combination of their attitude towards EGB and the social norm they perceive towards EGB:

$$Int[EGB] = b_0 + b_1Att[EGB] + b_2SN[EGB]$$

Theory of Planned Behaviour (TPB)

The TPB extends the TRA as it includes **Perceived Behavioural Control (PBC)** as an additional antecedent of behavioural intent. According to Ajzen (1991), variance in behaviour can be explained by individual's intention of perform behaviours. Attitude towards behaviour, subjective/social norm, and PBC are identified as the three determinants of behavioural intention. The TPB (Ajzen, 2002, p. 665) proposes that human behaviour is guided by the following three considerations:

> beliefs about the likely consequences or other attributes of the behaviour (behavioral beliefs), beliefs about the normative expectations of other people (normative beliefs), and beliefs about the presence of factors that may further or hinder performance of the behavior (control beliefs).

According to the TPB, both intention and PBC independently directly influence EGB (Ajzen, 1991). PBC is indicated as a direct determinant of EGB to the extent that PBC is an accurate reflection of actual behavioural control. Ajzen (1991) also argues that the effort put in to bring about certain behavioural outcomes will increase with PBC.

Here, PBC refers to employee's perceived control over choosing green behaviours. PBC can also be defined as the perceived ease or difficulty of performing a certain behaviour (Ajzen, 1991; Zhang, Wang & Zhou, 2014). Ajzen (2002, p. 668), defines PBC as "perceived control over performance of a behaviour." According to Ajzen (2002), PBC is a combination of perceived control over the salient control factors (c_i) and the perceived power (p_i) of the salient control factors. Strength of control belief refers to "the perceived likelihood (or frequency) of a given control factor being present" (Ajzen, 2002, p. 669), whilst power of control belief refers to "the extent to which the control factor's presence has the power to facilitate or impede performance of the behaviour" (Ajzen, 2002, p. 669). PBC is thus calculated as the sum of the product of c_i and p_i, summed over the q salient control factors (i.e. factors that make it easier or more difficult to perform the act in question). The TPB therefore argues that:

$$PBC[EGB] = \Sigma p_i c_i;\ I = 1, 2, \ldots, q$$

The TPB therefore argues that the employees' intention to display EGB is linearly determined by the weighted combination of their attitude towards EGB and the social norm they perceive

towards EGB and their perceived behavioural control over the factors that facilitate or constrain their ability to display EGB

$$Int[EGB] = b_0 + b_1Att[EGB] + b_2SN[EGB] + b_3PBC[EGB]$$[12]

Despite the fact that Bamberg and Möser's (2007) model does not include the direct path between PBC and PEB, in agreement with the TPB and Klöckner's (2013) meta-analysis of general environmental behaviour, the following hypotheses will be added to the EGB structural model.

Hypothesis 3: In the proposed EGB structural model it is hypothesised that PBC will positively affect EGB.

Hypothesis 4: In the proposed EGB structural model it is hypothesised that PBC will positively influence IAG.

Attitudes consist of individual's beliefs and expectations. With reference to the TPB, attitude refers to individuals' positive or negative evaluation of behaviour (Ajzen, 1991). For the purpose of the current study, **Green Attitude** refers to an employee's attitude towards EGB. Green Attitude is the multiplicative combination of outcome evaluations (e_i) and behavioural beliefs (b_i) that EGB will result in salient outcomes, summed over the salient outcomes. As previously mentioned, employees' IAG is hypothesised to be influenced by their Green Attitude (Ajzen, 1991). In agreement with the Bamberg and Möser (2007) model it can therefore be hypothesised that Green Attitude will influence employees' IAG (Bamberg & Möser, 2007; Klöckner, 2013).

Hypothesis 5: In the proposed EGB structural model it is hypothesised that Green Attitude will positively influence IAG.

In terms of the logic of the TPB, employees' intention to act green (IAG) should also be directly influenced by the social norm that they perceive to exist towards EGB. The Bamberg and Möser (2007) PEB model does, however not hypothesise such a direct linkage.

Bamberg and Möser's (2007) proposed model of PEB builds upon the TPB and further elaborates on this theory by recognising and incorporating variables such as Problem Awareness, Internal Attribution, Moral Norm, and Feelings of Guilt. In their model, Bamberg and Möser (2007) suggest various paths and relationships between these variables. While

[12] In as far as b_i, e_i, Nb_j, Mc_j, p_i and c_i could differ across the five second-order EGB factors the TPB equation could be expanded to $Int_j[EGB] = b_0 + b_{1j}Att[EGB] + b_{2j}SN[EGB] + b_{3j}PBC[EGB]$; j = 1, 2, …, 5

most of the paths make logical and theoretical sense, some of the paths are not acknowledged in the current study due to the lack of a sufficiently convincing reasoned argument.

Scherbaum *et al*. (2008) studied employee energy-conservation behaviour as an aspect of EGB. The research is based on the value-based norm (VBN) theory, which found that environmental personal norms is a significant predictor of conservation behaviours and employees' behavioural intentions (Chou, 2014; Scherbaum *et al*., 2008). Moreover, Scherbaum *et al*. (2008, pp. 830-831) find that:

> environmental personal norms were a statistically significant predictor of self-reported conservation behaviors at work, as well as behavioral intentions. We also found that environmental worldviews were a statistically significant predictor of environmental personal norms, and environmental personal norms mediated the relationship between environmental worldviews and reported conservation behaviors and behavioural intentions.

Bamberg and Möser (2007) distinguish between social and moral norms and propose that Social Norm has an indirect influence on intention, while Moral Norm is a direct determinant of intention. Social Norm represents the employees' perception of the expectancies that others hold and the motivation to meet these expectations. Moral Norm in turn refers to an individual's own evaluation and self-perception of the moral correctness of a certain behaviour (Tonglet, Phillips & Read, 2004). To acknowledge the internal locus of moral norms, various studies identify moral norms as personal norms (Chou, 2014, p. 339; Harland, Staats & Wilke, 1999; Ruepert *et al*., 2016). The current study recognises the term and shares consensus regarding the definition and conceptualisation of the personal norm construct. According to Ruepert *et al.* (2016, p. 60), "personal norms reflect self-expectations and are experienced as feelings of moral obligation to engage in the relevant behaviour."

For the purpose of this study, **Moral Norm** refers to the moral obligation that individuals experience in terms of behaving in an environmentally friendly manner. It can be argued that strong personal feelings and inner convictions of moral obligation and self-responsibility will motivate employees' intention to engage in behaviours to fulfil their moral obligation. In accordance with Hübner and Kaiser (2006), Klöckner (2013), and Bamberg and Möser's (2007) PEB model, this study also proposes a structural relationship between Moral Norm and IAG.

Hypothesis 6: In the proposed EGB structural model it is hypothesised that Moral Norm will positively influence IAG.

Social norm is conceptualised as individuals' personal perception of the expectations that certain reference groups or people hold with regards to their behaviour/performance. Social norm can also be referred to as external social pressure that individuals experience and their

motivation to comply with the expectations and pressure of significant reference groups (Whitmarsh & O'Neill, 2010; Wiernik, Ones & Dilchert, 2013). In the context of analysing employee's PEB in the workplace, social norms with regard to green behaviour will be referred to as **Green Social Norm (GSN**). GSN refers to all perceived external expectations and social pressure that relate to green behaviour in terms of employees' external normative belief and motivation to comply with the expectations of these reference groups.

Bamberg and Möser (2007) hypothesise that GSN positively influences employees' PBC of engaging in environmental behaviours. This path is not recognised in the current study, however, as a convincing argument could not be found to justify why employees' perception of significant reference groups' expectation and pressure to engage in certain green behaviour will influence their perception of power and control to engage in EGB.

The current study does, however, agree with Bamberg and Möser's (2007) position that GSN will influence individuals' attitude toward green behaviour. The perceived social pressure to perform or avoid certain behaviour will influence employee's Green Attitude. GSN could be expected to affect Green Attitude through its effect on the evaluation (e_i) component of attitude. It could be argued that the valence of pro-environmental outcomes should be enhanced when employees perceive strong GSN to exist since achieving these outcomes would mean complying with the expectations of salient reference groups.

Hypothesis 7: In the proposed EGB structural model it is hypothesised that GSN will positively influence Green Attitude.

Bamberg and Möser (2007) hypothesise that the social pressure of GSN will influence individuals' Moral Norm and personal feelings of moral obligation. They argue that Moral Norm occurs when the individuals' internalise GSN of significant reference groups in terms of green behaviour. Consistently being exposed to expectations to display EGB that one wishes to fulfil could logically be expected to over time translate into an internalised moral obligation to display EGB. Lülfs and Hahn (2013) also support this relationship.

Hypothesis 8: In the proposed EGB structural model it is hypothesised that GSN will positively influence Moral Norm.

Lastly, Bamberg and Möser (2007) hypothesise that Social Norm influences an individual's Feelings of Guilt. Perceived social expectations to display EGB will, however, not in and by itself result in Feelings of Guilt. **Feelings of Guilt** should emerge if an employee perceived a strong social norm to display EGB but fails to comply. For the purposes of this study it is therefore argued that the influence of GSN on Feelings of Guilt will be moderated by

employees' EGB. One could reason that employees will evaluate their EGB with the perceived GSN of significant reference groups, and that the overlap or conflict between the two will influence employee's Feelings of Guilt. Thus, an interaction effect of GSN*EGB is proposed. Since the direct influence of Social Norm on Feelings of Guilt (and on PBC) does not make logical sense[13], this proposed path of Bamberg and Möser (2007) is not incorporated into the current study's EGB structural model. The main effect of GSN on Feelings of Guilt is replaced in the current study by a GSN*EGB interaction effect.

Hypothesis 9: In the proposed EGB structural model it is hypothesised that GSN*EGB will positively affect Feelings of Guilt.

Employees should in terms of the expectancy theory be strongly motivated to display EGB when it has high perceived instrumentality for positively valenced outcomes but low perceived instrumentality for negatively valenced outcomes. The salience of negatively valenced outcomes is dependent on the extent to which employees are aware of and knowledgeable about the environmental dangers facing the planet. **Problem Awareness** refers to an individual's awareness of and knowledge about environmental issues and the negative consequences of harmful environmental behaviour[14].

It is probably not unreasonable to argue that employees, to the extent that they are aware and knowledgeable of the environmental problems facing the planet, will find the envisaged consequences facing the planet and its inhabitants in the absence of appropriate action negatively valenced. That will, however, not in and by itself motivate them to display EGB unless they believe that effort exerted in this regard will result in successful EGB, but more importantly, unless they perceive EGB as having high instrumentality in avoiding these negatively valenced outcomes. The extent to which employees are aware of the environmental problems facing the planet should therefore positively influence the strength of the motivation to display EGB (or the attitude towards displaying EGB). This takes place via its influence on the values of the evaluation (e_i) or valence ($Val[O_i]$) components, as well as via its effect on the nature of the outcomes that are regarded as salient. Bamberg and Möser (2007) do not hypothesise such a direct structural path between Problem Awareness and Green Attitude.

Hypothesis 10: In the proposed EGB structural model it is hypothesised that Problem Awareness will positively affect Green Attitude.

[13] No disrespect is intended to Bamberg and Möser (2007).

[14] The term Problem Awareness could be criticised as a too general concept that does not clearly point to the nature of the environmental problem that the current study has in mind here. The researcher, nonetheless, believes that when encountered in context the meaning of the term is clear enough. Moreover, a precise constitutive definition had been provided.

It does not seem unreasonable to argue that the impact of the extent to which employees are aware about the environmental problems facing the planet on their motivation to display EGB; will depend on the extent to which they understand and acknowledge that they, in their capacity as consumers, employees and home owners, are co-responsible for the problem rather than to attribute the problem to some external agency. According to Grob (1995, p. 210), "persons who attribute the causes of the environmental state to their own actions will act more appropriately towards the environment than those who attribute the causes to external influences such as natural law, chance, society, or peers." Moreover, Davis and Davis (1972, p. 123) define Internal Attribution as the "tendency to ascribe responsibility to personal forces (e.g., ability and effort)."

Over and above just recognising the environmental crisis and feeling guilty about the current state of the environment and actions that are harmful to the environment **Internal Attribution** occurs when individuals take environmental issues to heart. Instead of disassociating themselves with the problem, Internal Attribution refers to when individuals identify with and internalise their EGB. Consequently, these individuals recognise their role in/ accountability for their own actions pertaining to the environment. This study's definition of Internal Attribution is closely linked to Matilainen, Pohja-Mykrä, Lähdesmäki and Kurki's (2017, p. 33) definition of individual *psychological ownership* relating to natural resources. Hence, this is when individuals "positively associated with behaviour that contributes to the community's well-being and is voluntary, as well as to a willingness to assume personal risk or sacrifice" (Matilainen *et al*., 2017, p. 33). Moreover, Internal Attribution in the current study refers to the tendency to acknowledge one's personal accountability for the environmental problems faced worldwide. Internal Attribution is the extent to which individuals feel responsible and obligated. Internal Attribution is inferring that the outcome of an event or behaviour is due to, or caused by internal personal factors/ attributes.

The foregoing line of reasoning suggests an ordinal interaction effect between Internal Attribution and Problem Awareness on Green Attitude. The slope of the regression of Green Attitude on Problem Awareness should become steeper as Internal Attribution increases.

Hypothesis 11: In the proposed EGB structural model it is hypothesised that Internal Attribution*Problem Awareness will positively affect Green Attitude.

In addition, it seems reasonable to argue that the more knowledge an employee has about environmental problems like global warming and deforestation, the more the employees should appreciate that these problems cannot be attributed to everybody, but not to themselves. Employees that are more knowledgeable should appreciate that they themselves should accept personal co-responsibility for the environmental problems that the planet faces

and for their own green behaviour. A more sophisticated and penetrating understanding of the causes of the environmental problems that the planet faces invariably results in the realisation that each of us, through numerous choices we daily make, contribute to either the deterioration or the amelioration of the problem.

The knowledge and awareness that individuals have of environmental issues can therefore influence the extent to which they internally attribute responsibility. Bamberg and Möser (2007) also hypothesised this path between Problem Awareness and Internal Attribution.

Hypothesis 12: In the proposed EGB structural model, it is hypothesised that Problem Awareness positively influences Internal Attribution.

It would also make sense that the more a person accepts co-responsibility for prevailing environmental problems (in part because of their awareness and knowledge of the problem), the more likely that person is to experience Feelings of Guilt or shame when considering their behaviour with regard to these problems. More specifically, an increase in Internal Attribution should result in an increase of guilt, given that relatively little EGB is currently displayed. It is therefore argued that the fit/conflict between an individual's EGB and their Internal Attribution will influence the extent to which employees experience Feelings of Guilt. Thus, an ordinal Internal Attribution*EGB interaction effect on Feelings of Guilt is hypothesised. The slope of the regression of Feelings of Guilt on Internal Attribution should become steeper as EGB decreases. When EGB is high, the slope of the regression of Feelings of Guilt on Internal Attribution could approach zero.

Hypothesis 13: In the proposed EGB structural model it is hypothesised that Internal Attribution*EGB will positively affect Feelings of Guilt.

In contrast to Bamberg and Möser (2007) that hypothesised a direct effect of Problem Awareness on Feelings of Guilt, the current study only hypothesises an indirect effect mediated by Internal Attribution. Bamberg and Möser (2007) hypothesise that when individuals internally attribute responsibility, they will experience stronger Feelings of Guilt with regard to the environmental problems/behaviour. When individuals attribute the cause of behaviour internally and take personal responsibility, one can argue that this will elicit an emotional response in employees (Bamberg & Möser, 2007). Hence, the Internal Attribution of behaviour that is harmful to the environment can trigger Feelings of Guilt or shame.

Hypothesis 14: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively affect Feelings of Guilt.

Problem Awareness should also influence Social Norm, as a stronger awareness and broader knowledge of environmental problems will contribute to the GSN through its impact on the motivation to comply (Mc_j) with the green expectations of others. In agreement with Bamberg and Möser's (2007) model, the following hypothesis is therefore proposed with regards to the effect of employees' awareness and knowledge of environmental problems on GSN. This structural path was also proposed by Bamberg and Möser (2007), as well as Lülfs and Hahn (2013).

Hypothesis 15: In the proposed EGB structural model it is hypothesised that Problem Awareness will positively influence GSN.

Bamberg and Möser (2007) hypothesise that Problem Awareness will directly affect Moral Norm. The current study finds this a rather unconvincing hypothesis. The current study would rather argue that Internal Attribution, Feelings of Guilt and Social Norm mediate the effect of Problem Awareness on Moral Norm via four indirect effects.

Bamberg and Möser (2007) hypothesise that Internal Attribution, through which individuals accept a responsibility for environmental problems, directly influences GSN. It can be argued that Internal Attribution will influence employees' perception of social pressure and expectation to behave in an environmentally friendly manner and to avoid harmful environmental actions through its effect on the strength of the motivation to comply (Mc_j). In addition, Bamberg and Möser (2007) propose that Internal Attribution directly influences Moral Norm. This would be a logical conclusion, as employees that experience a strong sense of personal responsibility will feel more morally obligated to engage in EGB.

Hypothesis 16: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence GSN.

Hypothesis 17: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Moral Norm.

Bamberg and Möser's (2007) model also hypothesises that Internal Attribution directly influences Green Attitude. This reasoning is plausible as the extent to which employees internally attribute responsibility for environmental behaviour could influence their attitude towards EGB by driving the evaluation (e_i) of negative outcomes more negative, and positive outcomes more positive.

Hypothesis 18: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Green Attitude.

It can moreover be argued that Feelings of Guilt will affect Green Attitude via the effect it has on the valence/ employee's evaluation (e_i) of the salient positive outcomes associated with EGB. Thus, in agreement with Bamberg and Möser's (2007) model and other studies (Harth, Leach & Kessler, 2013; Lacasse, 2016, p. 155; Whitmarsh & O'Neill, 2010), it is hypothesised that Feelings of Guilt will positively influence employees' Green Attitude towards EGB.

Hypothesis 19: In the proposed EGB structural model it is hypothesised that Feelings of Guilt will positively affect Green Attitude.

Feelings of Guilt often arise as a consequence of a failure either to comply with or to meet certain obligations or pressures. Individuals experience Feelings of Guilt or shame when their behaviour is incongruent with their perceived social and moral norms. Guilt occurs when an individual feels they are responsible for either causing harm or contributing to harmful outcomes that may include feelings of regret. According to Baumeister (as cited in Bamberg & Möser, 2007, p. 16), Feelings of Guilt result in a strong emotional feeling of moral obligation to compensate for damage that was caused. Hence, it can be argued that employees would experience a moral obligation/ responsibility to act green if they feel guilty about their individual contribution to the global problem (Harth *et al.,* 2013).

Hypothesis 20: In the proposed EGB structural model it is hypothesised that Feelings of Guilt will positively influence Moral Norm.

To conclude, Bamberg and Möser (2007) advocate that Internal Attribution is a significant determinant of variance in GSN, Feelings of Guilt, Moral Norm and Green Attitude. The current study concurs with and will employ the paths proposed by Bamberg and Möser with regards to the influence of Internal Attribution.

Bamberg and Möser (2007) suggests that Feelings of Guilt have a direct influence on PBC. Their reasoning in support of a direct path between Feelings of Guilt and PBC does not make a sufficiently convincing argument to hypothesise such a path in the current study. Due to the lack of coherent argument in support of the proposed path, Bamberg and Möser's (2007) view that Feelings of Guilt directly influence PBC will not be incorporated in this current study's EGB structural model.

Considering the fact that this study examines EGB in the workplace, and not general PEB, additional variables and structural paths have been identified to elaborate the PEB model proposed by Bamberg and Möser (2007). In short, Rewards and Recognition, Organisational Green Culture (OGC), and Green Values were also recognised as factors that influence and motivate EGB.

Rewards and Recognition of behaviour refers to the extent to which EGB performance is formally rewarded. Rewards and Recognition is an external reason that motivates EGB, and can be seen as organisations' formal response to an employee's behaviour and can serve as an incentive that motivates employees to engage in EGB (Govindarajulu & Daily, 2004, p. 368; Zibarras & Coan, 2015, p. 2124). Employee's green performance in the workplace will therefore determine the rewards and recognition that employees receive for their behaviour. Employees' evaluation of the Rewards and Recognition received as an outcome for their green behaviour will in turn possibly influence their attitude toward green behaviour. Thus, this study proposes that the outcome of EGB will influence the Rewards and Recognition that employees will receive, which in turn will influence employee's Green Attitude.

Hypothesis 21: In the proposed EGB structural model it is hypothesised that EGB will positively influence Rewards and Recognition.

As previously mentioned with regards to Vroom's expectancy theory, valence (or evaluation in the TRA) refers to individuals' evaluation of the value and desirability that they attach to EGB. Expectation (or belief in the TRA) in turn refers to the belief that individuals hold that their attempt to display EGB will meet with success. Instrumentality refers to the subjective probability that EGB will lead to the salient outcomes. The valence of EGB depends on the valence of the outcomes multiplicatively combined with the instrumentality of EGB in achieving these outcomes. Successful attainment of rewards offered for EGB should strengthen the valence associated with the EGB. Rewards and Recognition can therefore be hypothesised to feedback onto Green Attitude (i.e. influence their attitude towards green behaviour) via its effect on the Val [EGB].

Hypothesis 22: In the proposed EGB structural model it is hypothesised that Rewards and Recognition will positively affect Green Attitude.

Employees' experience of past behaviour in addition can influence the attitude that they form towards this behaviour (Ajzen, 1991; Tonglet *et al*., 2004; Lacasse, 2016) via its influence on the expectancies or beliefs. Hence, it is hypothesised that EGB will feedback to influence employees' Green Attitude (Govindarajulu & Daily, 2004, p. 369).

Hypothesis 23: In the proposed EGB structural model it is hypothesised that EGB will positively affect Green Attitude.

In the current study, **Organisation Green Culture** (OGC) refers to the shared pro-environmental values, beliefs, attitudes, practices and assumptions fostered by the organisation and its leaders. One can theorise that an organisation with a strong green culture

is more likely to facilitate EGB and to motivate employees to engage in green behaviour (Norton, Zacher & Ashkanasy, 2014; Zibarras & Coan, 2015, p. 2125).

It can be argued that OGC influence the type of GSNs that employees form and experience. Considering that an organisational culture governs the behaviour of its employees, one can argue that the organisational culture will determine the perceived social norm by creating a behavioural expectation of EGB among employees, and through its effect on employees' motivation to comply with such expectations. Accordingly, this study introduces OGC as a new latent variable and hypothesises that it will influence the GSN that employees perceive.

Hypothesis 24: In the proposed EGB structural model it is hypothesised that OGC will positively influence GSN.

The nature of the organisational culture can influence the extent to which employees are allowed and motivated to act in a pro-environmental manner. For example, if an organisation values caring for the environment, has various interventions in place that allow and encourage employees to behave pro-environmentally in the workplace, these employees will have more support from the work environment to engage in EGB than employees in an organisation that does not encourage PEB at all. This line of reasoning seems to suggest that the strength of the OGC should affect PBC. After a long process of reasoning and consideration, one cannot help but question whether OGC directly influences PBC. It can be argued that the strength and nature of an organisation's green culture will influence the extent to which employees perceive that they have control and power over their green behaviour. Whilst this path might seem to be an obvious conclusion, because of a lack of proof and insufficient evidence of this relationship in practice, the path from OGC to PBC will not be added to the EGB structural model.

Ones *et al*. (2015) contend that employees will be more motivated to behave in a green way if they hold certain pro-environmental values aimed at protecting the environment. Schultz *et al*. (2005) provide cross-cultural evidence for the relationships between environmental attitudes, values, and environmental behaviours. Schultz *et al*. (2005) distinguish between Environmental Worldview, Environmental Concern, and Environmental Attitude. Firstly, Environmental Worldview is seen as an individual's view and belief of the relationship between humankind and nature[15]. Secondly, Environmental Concern is used when referring to affect, or emotions and feelings that relate to environmental issues. Lastly, Environmental Attitude

[15] Future research could possibly consider the possible relationship between a worldview that stresses the position that man is an integral component of Nature in which Nature is dependent on man, in which man is dependent on Nature and in which man carries a responsibility towards Nature on Internal Attribution.

refers to the beliefs, attitudes and behavioural intentions towards the environment (Schultz *et al*., 2005) rather than towards the act of behaving green[16].

While Whitmarsh and O'Neill (2010) identified and measured pro-environmental values with the new environmental paradigm (NEP) scale, the authors pointed out that this value can be seen as more of an Environmental Worldview than a value. Even though the current study acknowledges that previous studies have recognised and defined Environmental Worldview as a separate concept, for the purpose of the EGB structural model this study only examines and distinguished between environmental/green attitude, values, and behaviour.

Schwartz proposed ten values that motivate human behaviour (Schwartz *et al*., 2001). Two items of Schwartz's value of *Universalism*[17] are associated with environmental issues, namely 'protecting the environment' and 'unity with nature' (Schultz *et al*., 2005). Thus, it can be argued that individuals with a strong Universalism Value could be more motivated to engage in EGB in the workplace. Schultz and Zelezny (1999) base their research on a regression analysis of the relationship between Schwartz's universal values and various environmental attitudes across 14 different countries. Their study established that the value of universalism positively and strongly associates with ecocentrism[18] and the NEP. Furthermore, the value of universalism is proven to be a strong positive predictor of the environmental attitudes that individuals would display.

Self-transcendence (characterised by the values of universalism and benevolence) and Self-enhancement (characterised by values of achievement and power), two of Schwartz's values categories, are examined to determine the relationship between values and environmental attitudes. Schultz *et al*. (2005) finds that Self-transcendence has a positive relationship with environmental behaviour, while Self-enhancement has a negative relationship with environmental behaviour. Schultz *et al*. (2005) also finds a significant and positive relationship between biospheric attitudes and Self-transcendence, and a negative relationship with Self-enhancement.

According to the VBN theory, values, norms and beliefs are the antecedents of environmental behaviour (Scherbaum *et al*., 2008, pp. 821-822). The Stern's value-based theory explains the relationship between values and environmental attitudes. When referring to pro-

[16] Future research could possibly consider the possibility of incorporating Environmental Concern, and Environmental Attitude in the EGB structural model as latent variables mediating the effect of Problem Awareness on some of the down-stream latent variables. Awareness of a problem does not necessarily translate to a concern about the problem.

[17] Schwartz *et al*. (2001, p. 521) define universalism as "Understanding, appreciation, tolerance and protection for the welfare of all people and for nature".

[18] Schultz and Zelezny (p. 257) explain ecocentrism as "Ecocentric concern centers on the instrinsic value of plants and animals".

environmental values, **Green Values** is the preferred term employed in the current study. Environmental concern as defined by Schultz *et al.* (2005) corresponds to the current study's definition of Green Values, as well as Schwartz's value of Universalism. Green Values thus refer to the worth, value, and affect that individuals attach to the environment and nature. The current study proposes that stronger Green Values will directly influence and lead to a stronger Green Attitude towards EGB through its effect on the strength of the evaluation (e_i) of salient positive and negative outcomes associated with EGB.

Hypothesis 25: In the proposed EGB structural model it is hypothesised that Green Values will positively influence Green Attitude.

Schultz *et al*., (2005) further propose that the norm-activation model plays a moderating role in the relationship between values and environmental behaviours. The normative-activation model (NAM) recognises that helping behaviour is influenced by individual's awareness and recognition of harmful consequences and their ascription to take responsibility. This study proposes that Green Values will determine/influence the extent to which employees internally attribute responsibility.

This study's review of past literature suggests that stronger personal Green Values will influence and increase an employee's feeling of responsibility and the extent to which employees internally attribute responsibility. In other words, employees with stronger Green Values can be more likely to admit and acknowledge their personal responsibility towards environmental matters and behaviour. Internal Attribution also mediates the relationship between Green Values and Feelings of Guilt.

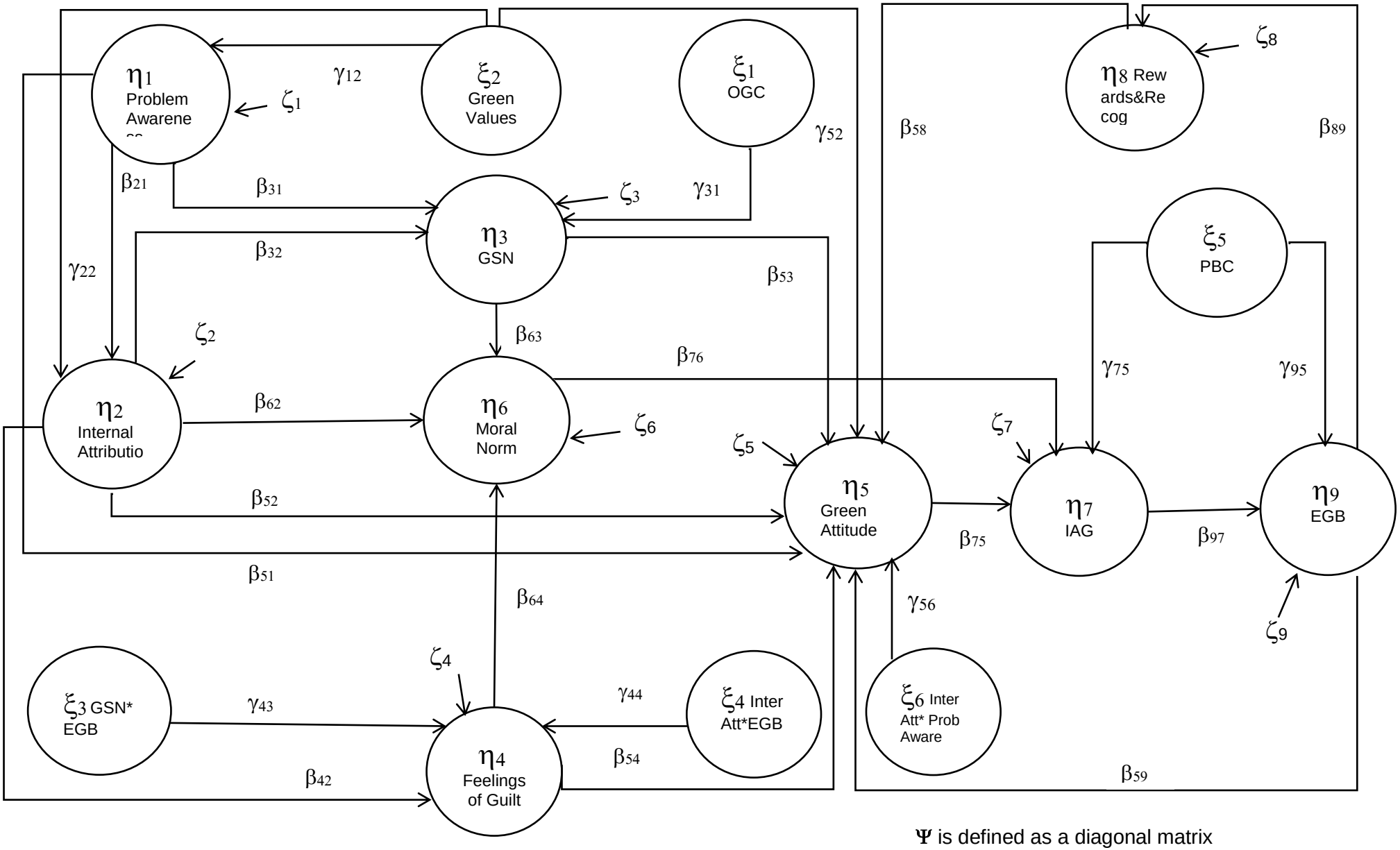
Hypothesis 26: In the proposed EGB structural model, it is hypothesised that Green Values will positively influence Internal Attribution.

It can also be hypothesised that the strength of employee's Green Values will determine and influence the extent to which they are searching for information on environmental themes and the extent to which they are receptive to publications and media coverage on environmental themes, and consequently their knowledge and awareness of environmental problems. Employees that value, respect and care for the environment might be more interested in and aware of environmental problems, as they would put more effort into gaining knowledge concerning these issues. Another way to put this would be to state that employees that have Green Values might be more sensitive to environmental matters, which can lead to easier recognition of environmental problems (i.e. Problem Awareness).

Hypothesis 27: In the proposed EGB structural model, it is hypothesised that Green Values will positively affect Problem Awareness.

2.5. THE PROPOSED EMPLOYEE GREEN BEHAVIOUR STRUCTURAL MODEL

The totality of the forgoing argument cumulated to form the EGB structural model depicted in Figure 2.2. The structural model serves as a schematic illustration that depicts the hypothesised psychological mechanism that regulates the level of competence that employees achieve on the EGB performance dimension. Figure 2.2 represents the schematic portrayal of the overarching substantive research hypothesis (Hypothesis 1), which the current study offers as an answer to the research-initiating question.



Ψ is defined as a diagonal matrix
All off-diagonal elements in Φ are freed to be estimated

Figure 2.2. **Employee Green Behaviour structural model**

CHAPTER 3
RESEARCH METHODOLOGY

"The highest heavens belong to the Lord, but the earth He has given to mankind."
-Psalm 115:16

3.1. INTRODUCTION

All fruitful research starts with introducing a research-initiating question, which in turn gives rise to theorising, which then results in the development of substantive research hypotheses that are seen as tentative, untested responses to this research-initiating question. The funnel-like argument presented in Chapter 1 made the point that EGB is important among employees, the need was argued for purposeful and rational interventions to enhance green behaviour, and the research-initiating question was raised as to why variance in EGB occurs across employees and organisations. As mentioned in Chapter 1, the research-initiating question was stated as an open-ended question. Consequently, the research-initiating question was answered in Chapter 2 through the proposed overarching substantive research hypothesis that describes the nature of the presumed psychological mechanism that regulates differences in EGB by describing that nature of the structural relationships that were hypothesised to exist between the latent variables that were identified as relevant to the mechanism. The proposed structural model serves as a structural illustration of these path-specific substantive research hypotheses on the nature of the relationships that exist between the components of the psychological mechanism.

Referring back to the research-initiating question proposed in Chapter 1, the study acknowledges that the theorising in Chapter 2 exceeds that which can be empirically tested. Hence, the initially proposed latent variables and structural paths have been re-evaluated to determine what will be included in the final revised EGB structural model. To allow the confident derivation of HR interventions from the overarching substantive hypothesis that was developed in Chapter 2 in response to the research-initiating question (and depicted as a structural model in Figure 2.2.), these hypotheses need to be empirically tested. The validity (and credibility) of the verdicts on the validity of these hypotheses will depend on methodology that will be used to empirically test them. The following section will describe the methodology that will be used to test the hypotheses that emerges through theorising in Chapter 2.

The proposed methodology in Chapter 3 is based on scientific principles. The use of the scientific method enhances the probability of reaching a valid conclusion on the validity of the proposed substantive research hypotheses (Theron, 2016d). Methodology serves the epistemic ideal of science, as science proposes that probability of valid conclusions increases to the extent that the research methodology is objective and rational. Objectivity refers to a

focused, explicit, conscious focus on minimising error. Minimising error in decision-making on the truth of the hypotheses maximises the probability of a valid verdict. Rationality is achieved when the methodological choices of the researcher are presented to knowledgeable peers to identify possible shortcomings and flaws.

The latter of these two characteristics can only be achieved if the researcher provides an adequate and comprehensive description of the methodological choices that were made. The research methodology chapter includes the research problem, substantive research hypotheses, research design, statistical research hypotheses, sampling procedure, measuring instruments, and the statistical analysis techniques.

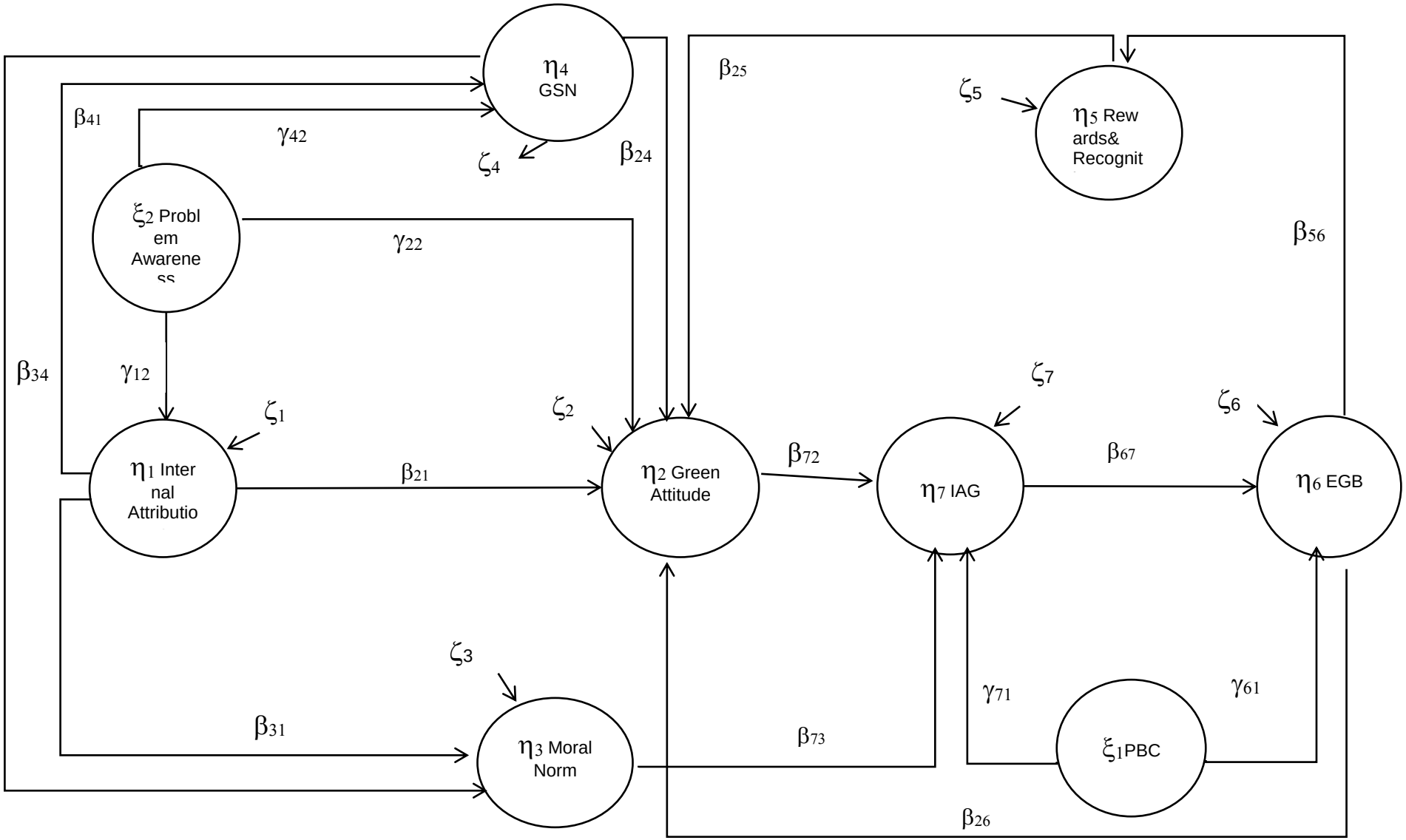
3.2. SUBSTANTIVE RESEARCH HYPOTHESES

In response to the research-initiating question in Chapter 2, the substantive research hypotheses posit that the positions gained through the process of theorising are valid (Theron, 2016b). The initial substantive research hypotheses were developed through theorising in the literature study and resulted in the derivation of the EGB structural model schematically displayed in Figure 2.2.

In the process of conducting a research study one should first consider the practical feasibility of the study. One does not want to unnecessarily burden participants with excessively long questionnaires and in return reduce the value of the research results. Testing the entire proposed model would have resulted in an excessive questionnaire that will be too time consuming and cognitively strenuous for participants- which could increase fatigue, cognitive load, and errors. Moreover, it would have required a large sample giving that the number of freed model parameters increase as the model increases in size. Hence, the logical solution was to reduce the initially proposed model. Although the ideal would be to include all of the variables in the model and measure each of the constructs proposed in the comprehensive model, this was unfortunately not practically feasible. Hence, it was more logical to reduce the hypothesised EGB structural model proposed in Chapter 2 (Figure 2.2.).[19] The reduced model is displayed in Figure 3.1[20].

[19] An alternative worth exploring in future is to build planned missingness (Graham, Taylor, Cumsille & Olchowski, 2006) into the data collection design so that responses to specific items are missing completely at random for specific subsets of the total sample. Each participant therefore only completes a subset of the items of the comprehensive research questionnaire.

[20] This decision could raise the criticism that the choice of latent variables to include in the study should have been made at the outset of the research. The current study respectfully disagrees. The theorising should be allowed to occur unbridled in response to the research-initiating question. Only in this manner will the discipline stand any reasonable chance of developing a valid understanding of the complex mechanism at work. Only once a stance on the larger model has been developed can a decision be reached on which part of the model the empirical part of the study should focus on without leaving out integral latent variables.



Ψ is defined as a diagonal matrix
All off-diagonal elements in Φ are freed to be estimated

***Figure 3.1*. Revised Employee Green Behaviour structural model**

Despite the theoretically sound and convincing arguments proposed for various latent variables and their relationships in Chapter 2, the study was not capable of including all of the suggested path-specific substantive research hypotheses derived through theorising. Subsequently, most of the peripheral latent variables from the original model (Figure 2.2.) were excluded, such as OGC, GSN*EGB, Internal Attribution*EGB, Internal Attribution*Problem Awareness, Green Values and Feelings of Guilt.

The fact that OGC was hypothesised to only influence one other variable in the proposed model, as well as the possible overlap between OGC and GSN, OGC will be excluded from the revised model. To operationalise the latent interaction effects, namely GSN*EGB, Internal Attribution*EGB, and Internal Attribution*Problem Awareness, would require many indicators and unnecessarily increase pressure on the sample size. Consequently, these two latent interaction effects are removed from the model. In coherence with the need to reduce the initial model, an overwhelming sense of uncertainty pertaining the conceptualisation of Green Values, grants the exclusion of the latent variable from the model that will be empirically tested. Lastly, Feelings of Guilt is also excluded to reduce the model size and amount of hypothesised relationships between latent variables. Consequently, it was decided that the following hypotheses would *not* be tested in the reduced model:

Hypothesis 9: In the proposed EGB structural model it is hypothesised that GSN*EGB will positively affect Feelings of Guilt.

Hypothesis 11: In the proposed EGB structural model it is hypothesised that Internal Attribution*Problem Awareness will positively affect Green Attitude.

Hypothesis 13: In the proposed EGB structural model it is hypothesised that Internal Attribution*EGB will positively affect Feelings of Guilt.

Hypothesis 14: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively affect Feelings of Guilt.

Hypothesis 19: In the proposed EGB structural model it is hypothesised that Feelings of Guilt will positively affect Green Attitude.

Hypothesis 20: In the proposed EGB structural model it is hypothesised that Feelings of Guilt will positively influence Moral Norm.

Hypothesis 24: In the proposed EGB structural model it is hypothesised that OGC will positively influence GSN.

Hypothesis 25: In the proposed EGB structural model it is hypothesised that Green Values will positively influence Green Attitude.

Hypothesis 26: In the proposed EGB structural model it is hypothesised that Green Values will positively influence Internal Attribution.

Hypothesis 27: In the proposed EGB structural model it is hypothesised that Green Values will positively affect Problem Awareness.

The only latent variables that had been retained in the reduced and revised EGB structural model were EGB, IAG, PBC, Green Attitude, GSN, Moral Norm, Rewards and Recognition, Problem Awareness and Internal Attribution. Due to the reduction of the initially proposed EGB structural model (Figure 2.2), the numbering of the hypotheses proposed in Chapter 2 differed from the newly stated hypotheses in Chapter 3.

Because of the theorising in Chapter 2 and the need to reduce the model size, the substantive research hypotheses had been developed to empirically test the revised EGB structural model. As a subset of the initially proposed EGB structural model depicted in Figure 2.2., the reduced EGB structural model that had been tested is displayed in Figure 3.1. The overarching substantive research hypothesis (Hypothesis 1) states that the revised EGB structural model (as seen in Figure 3.1.) provides a valid description of the psychological process underpinning EGB (i.e. provides a valid description of the psychological process (or mechanism) that determines the level of EGB displayed). The overarching substantive research hypothesis of the model can be taken apart and dissected into a further sixteen path-specific substantive research hypotheses:

Hypothesis 2: In the proposed EGB structural model it is hypothesised that IAG will positively affect EGB[21].

Hypothesis 3: In the proposed EGB structural model it is hypothesised that PBC will positively affect EGB.

Hypothesis 4: In the proposed EGB structural model it is hypothesised that PBC will positively influence IAG.

Hypothesis 5: In the proposed EGB structural model it is hypothesised that Green Attitude will positively influence IAG.

[21] The phrase *in the proposed EGB structural model it is hypothesised that* was used on purpose to acknowledge that each hypothesis claims that a specific exogenous latent variable (ξ_i) or endogenous latent variable (η_i) influences a specific endogenous latent variable (η_j) when controlling for the other latent variables that are structurally linked to η_j.

Hypothesis 6: In the proposed EGB structural model it is hypothesised that Moral Norm will positively influence IAG.

Hypothesis 7: In the proposed EGB structural model it is hypothesised that GSN will positively influence Green Attitude.

Hypothesis 8: In the proposed EGB structural model it is hypothesised that GSN will positively influence Moral Norm.

Hypothesis 9: In the proposed EGB structural model it is hypothesised that Problem Awareness will positively affect Green Attitude.

Hypothesis 10: In the proposed EGB structural model it is hypothesised that Problem Awareness positively influences Internal Attribution

Hypothesis 11: In the proposed EGB structural model it is hypothesised that Problem Awareness will positively influence GSN.

Hypothesis 12: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence GSN.

Hypothesis 13: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Moral Norm.

Hypothesis 14: In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Green Attitude.

Hypothesis 15: In the proposed EGB structural model it is hypothesised that EGB will positively influence Rewards and Recognition.

Hypothesis 16: In the proposed EGB structural model it is hypothesised that Rewards and Recognition will positively affect Green Attitude.

Hypothesis 17: In the proposed EGB structural model it is hypothesised that EGB will positively affect Green Attitude.

3.3. RESEARCH DESIGN

The overarching substantive research hypothesis proposed specific relationships between the endogenous and the exogenous latent variables. The scientific method of inquiry requires empirical evidence to support the substantive research hypothesis by testing the substantive research hypothesis directly. Consequently, empirical support had to be obtained through a research design that serves to explain the logic of the plan through which the evidence was generated that commented on the validity of the overarching and path-specific substantive hypotheses (Theron, 2016d).

An *ex post facto* correlational design with two or more indicators variables per latent variable was regarded as appropriate because the exogenous latent variables in the structural model could not be experimentally manipulated (Theron, 2016d). Since the structural model contained two or more endogenous latent variables that are affected by two or more exogenous latent variables, and causal relations were hypothesised to exist between the endogenous latent variables the design had to acknowledge that structural equation modelling (SEM) had to be used as the analysis technique to analyse the data to test the statistical hypotheses.

The *ex post facto* correlation design directed the researcher to collect data on two or more indicator variables per latent variable from n observations, and to subsequently calculate the observed variance-covariance matrix. The structural equation modelling programme (LISREL 8.8) was then tasked with iteratively finding estimates for the freed comprehensive LISREL model[22] parameters that minimise the discrepancy between the observed and estimated covariance matrices. The logic underlying the design is that the model will only be seen as a plausible model if parameter estimates can be found for the freed model parameters that can accurately reproduce the observed covariance matrix. This will indicate that the model fits the data. Model fit implies that the model and its parameter estimates provide a plausible description/account of the process underpinning the phenomenon of interest. However, the model will be seen as invalid if model fit is not found and the model parameter estimates cannot be found that accurately reproduce the observed covariances between observed variables.

3.4. STATISTICAL HYPOTHESES

In the previous section an argument for the choice of the research design was proposed. SEM was used as the statistical analysis technique through which the validity of the proposed EGB model was tested through the use of an *ex post facto* correlation design. Furthermore, the substantive research hypotheses have been identified in paragraph 3.3. The substantive research hypotheses will be directly tested by operationalising the latent variables comprising the structural model through two or more latent variables and then attempting to reproduce the observed covariances between the indicator variables. The operationalisation of the latent variables through measured operational definitions allows the use of sophisticated mathematical logic to determine the conditional probability of sample parameter estimate values under specific hypotheses about the parameter values. To allow the testing of the overarching and path-specific substantive research hypotheses in a manner that allows the

[22] The comprehensive LISREL model comprises the measurement model that hypothesises specific structural relations between the latent variables and specific indicator variables and a structural model that hypothesises structural relations between specific latent variables.

use of this sophisticated mathematical logic creates the need to translate these substantive hypotheses into statistical hypotheses. Based on the LISREL notational system, the following statistical hypotheses have been formulated.

If the overarching substantive research hypothesis is interpreted in a literal manner indicating that the EGB structural model provides a perfect account of the psychological processes underpinning EGB, the exact fit null hypothesis can be derived from the overarching substantive research hypothesis. The exact fit null hypothesis (Hypothesis 1a) can be expressed as:

H_{01a}: RMSEA = 0
H_{a1a}: RMSEA > 0

Nevertheless, in reality structural models are seen as approximations and seldom provide an exact fit with the population (Theron, 2016d). If the overarching substantive research hypothesis is not interpreted in a literal manner, but rather that the EGB structural model provides an approximate account of the psychological processes underpinning EGB, the close fit null hypothesis can be derived from the overarching substantive research hypothesis. The close fit null hypothesis (Hypothesis 1b) can be expressed as:

H_{01b}: RMSEA ≤ .05
H_{a1b}: RMSEA > .05

In addition to the overarching substantive hypothesis (Hypothesis 1), sixteen path-specific statistical hypotheses have been formulated to test the validity of the proposed path-specific substantive hypotheses. These sixteen path-specific statistical hypotheses were only tested if the comprehensive LISREL model fits the data at least reasonably well. If the model showed close fit, it permitted the testing of the path-specific null hypotheses. Derived from the revised EGB structural model (Figure 3.1), the path coefficient statistical hypotheses for each of the individual causal effects have been identified and summarised below in Table 3.1.

Table 3.1.
Path coefficient statistical hypotheses[23]

Hypothesis 2:	**Hypothesis 6:**	**Hypothesis 10:**	**Hypothesis 14:**
H_{02}: $\beta_{67} = 0$	H_{06}: $\beta_{73} = 0$	H_{010}: $\gamma_{12} = 0$	H_{014}: $\beta_{21} = 0$
H_{a2}: $\beta_{67} > 0$	H_{a6}: $\beta_{73} > 0$	H_{a10}: $\gamma_{12} > 0$	H_{a14}: $\beta_{21} > 0$

[23] The β_{ij} and γ_{ij} referred to in the path coefficient statistical hypotheses should (in most cases) be interpreted as partial regression coefficients that describe the slope of η_i on η_j or ξ_j when controlling for the other latent variables that had been structurally linked to η_i in the structural model. Strictly speaking the statistical hypotheses should therefore have been written in the format H_{02}: $\beta_{75} = 0 | \gamma_{72} \neq 0$ H_{a2}: $\beta_{75} > 0 | \gamma_{72} \neq 0$.

Table 3.1.
Path coefficient statistical hypotheses (continued)

Hypothesis 3:	Hypothesis 7:	Hypothesis 11:	Hypothesis 15:
H_{03}: $\gamma_{61} = 0$	**H_{07}: $\beta_{24} = 0$**	**H_{011}: $\gamma_{42} = 0$**	**H_{015}: $\beta_{56} = 0$**
H_{a3}: $\gamma_{61} > 0$	**H_{a7}: $\beta_{24} > 0$**	**H_{a11}: $\gamma_{42} > 0$**	**H_{a15}: $\beta_{56} > 0$**
Hypothesis 4:	**Hypothesis 8:**	**Hypothesis 12:**	**Hypothesis 16:**
H_{04}: $\gamma_{71} = 0$	H_{08}: $\beta_{34} = 0$	H_{012}: $\beta_{41} = 0$	H_{016}: $\beta_{25} = 0$
H_{a4}: $\gamma_{71} > 0$	H_{a8}: $\beta_{34} > 0$	H_{a12}: $\beta_{41} > 0$	H_{a16}: $\beta_{25} > 0$
Hypothesis 5:	**Hypothesis 9:**	**Hypothesis 13:**	**Hypothesis 17:**
H_{05}: $\beta_{72} = 0$	H_{09}: $\gamma_{22} = 0$	H_{013}: $\beta_{31} = 0$	H_{017}: $\beta_{26} = 0$
H_{a5}: $\beta_{72} > 0$	H_{a9}: $\gamma_{22} > 0$	H_{a13}: $\beta_{31} > 0$	H_{a17}: $\beta_{26} > 0$

3.5. SAMPLING

This study aimed to gain insight and understanding of why employees vary in the extent to which they display and/or engage in green behaviour in the workplace. This study focused on employees that permanently and fulltime work for an organisation in the public or private sector in South Africa. The proposed study thus identified all permanent, fulltime employees in South Africa, in the private or public sector, as the target population.

A target population refers to the total group of elements that is implied by the research-initiating question, the overarching research problem and the overarching substantive research hypothesis. The research findings should be generalisable to the target population of interest. The target population is therefore the population from which the research study aspired to select a representative sample. A sampling population can be defined as the total group of elements in the target population that have a nonzero probability of being included in the sample. The sampling population is therefore the population from which the sample is effectively selected. Although the ideal would be to have a sample population that fully and with complete accuracy represented the whole target population, this ideal more often than not renders itself impossible (Theron, personal communication, July 26, 2016). It is crucial to acknowledge that the sample and target population will not completely coincide. The objective should thus be to firstly recognise the magnitude of the sampling gap between the target population and the sampling population, and then to attempt to minimise this gap. The sampling gap refers to the extent to which the sampling and target populations do not coincide. A large sampling gap reduces the representativeness of the sample that is selected from the sampling population of the target population.

A sample can be defined as a selected, smaller (ideally representative) group of elements from the target population that are selected to be included in the investigation (Theron, 2016g). According to Salkind (2010), a sample can be defined as a subset of a population. The unit of analysis for this study included fulltime employees from companies in South Africa that have taken action to indicate that they strive to engage in pro-environmental practices.

For the purpose of this study, the set of fulltime employees at these companies is therefore the sampling population for the current study. A substantial, non-ignorable sampling gap is thereby acknowledged which prevents the confident generalisation of the study findings to the target population. Caution should be taken when generalising the findings and outcomes of the research study to the general population (De Goede & Theron, 2016).

The following argument explains the choice of the companies as the sampling population. These companies are companies that have taken action to indicate that they strive to engage in pro-environmental practices. As argued in Chapter 1, it would be rather ironic if a company appears to value the environment and has various systems and strategies in place that are pro-environmental; but fails to acknowledge that the behaviour of their employees should also coincide with this in order for the company to actually perform in a green manner that positively contributes to the environment.

Given that it is not practically feasible to include an entire sampling population in the investigation; an alternative method had to be used (Salkind, 2010). A representative sample had to be used to represent and reflect the target population. A sample is representative to the extent that it shares and reflects the same characteristics that the study aims to investigate, as the target population. According to Salkind (2010, p. 1296), “in hypothesis testing, the sample data are used to determine whether a possible value of the population parameter, which is contained in the null hypothesis, can be rejected.”

The representativeness of the selected sample of the target population depended firstly on the magnitude of the sampling gap. The representativeness of the selected sample depended secondly on the manner in which the sample was selected from the sampling population. It should be ensured that the sample is representative of the sampling population.

3.5.1. Sampling Technique

A distinction can be made between two types of sampling procedures; namely probability and non-probability sampling. Probability sampling is a sampling procedure where each element in the population has a known nonzero positive chance or probability of being selected and included in the sample (Salkind, 2010; Theron, 2016g). Given a high response rate, probability sampling permits the generalisation of the research findings to the population with reasonable certainty. The ideal would have been to have utilised a two-stage cluster sampling procedure in which a number of green companies are selected randomly with probability proportional to size (Babbie and Mouton, 2001) and employees are selected randomly from the selected organisations. Unfortunately, this was not possible. Firstly, no list of green organisations was available. Secondly, even if there was such a list, the researchers had no mandate to force

randomly selected organisations to participate in the research. The latter principal also extended to the second stage of selection. The researchers had no mandate to force selected employees in selected organisations to participate in the research. At best the researcher could extend invitations to organisations in the sampling population to participate in the research, and if they agreed to take part in the research, to employees within these organisations. The researcher was therefore forced to use a non-probability sampling procedure in which specific organisations were approached to participate in the research, and if they agreed, all full-time employees were invited to participate in the research. The employees, however, made the final decision whether they accepted the invitation and selected themselves into the sample. This is acknowledged as a methodological weakness in the current study.

3.5.2. Sampling Size

Sampling is a crucial aspect of any research study's methodology. The importance of the sampling procedure stems not only from the critical role that the representativeness of the sample plays in the validity of the research findings but also from the critical role that sample size plays. The importance of sample size is evident in its effect on the statistical power. According to Eng (2003, p. 310), "statistical power is the probability that a statistical test will indicate a significant difference when there truly is one." More generally statistical power refers to the probability to reject the null hypothesis when H_0 is false (Tabachnick & Fidell, 2001).

Sample size refers the number of elements/units of analysis that were included in the sample. There are various strategies that can be used to determine the appropriate size of a sampling population (Eng, 2003). There are three perspectives to consider when deciding on and determining the required sample size, namely statistical power, the ratio of observations to freed parameters, as well as time, financial and logistic considerations.

a) Statistical power (Preacher and Coffman R software)

Firstly, the current study approached the question of sample size from the perspective of the statistical power of the tests of exact and close fit. The statistical power of the test of exact fit and the test of close fit is (amongst others) a function of the sample size. It is important that the sample size is adequate in ensuring that the statistical power of the test of exact fit and the test of close fit is sufficiently high but not too high (i.e., that the sample is large enough but not too large). According to Theron (2016g), in the context of SEM, statistical power refers to the conditional probability of rejecting the exact or close fit null hypothesis given that it is false.

Moreover, statistical power refers to the probability of rejecting the close fit null hypothesis (H_0: RMSEA≤ .05) (or exact fit null hypothesis) given that it is false and should be rejected (i.e.,

the model fit actually is mediocre (H_a: RMSEA> .05) (Theron, 2016f). Statistical power can be calculated with an exact fit test (i.e. testing the null hypothesis that the model fits perfectly in the population), as well as the power associated with a close fit test (i.e. testing the null hypothesis that the model has a close, but imperfect fit in the population) (Theron, 2016g).

To estimate sample size, MacCallum, Browne and Sugawara (1996) developed power tables for exact and close fit, that the current study could have used to derive sample size estimates, given a significance level (α) of .05, power level of .80, and degrees of freedom (v) of (½[p+q][p+q+1])-t = (½[17+4][17+4+1])-59= 172[24]. These were, however, considered to be too inflexible and therefore the software developed by Preacher and Coffman's (2006) in R was rather be used.

Preacher and Coffman's (2006) R software (given a significance level (α) of .05, power level of .80, and degrees of freedom (v) of (½[p+q][p+q+1])-t = (½[17+4][17+4+1])-59= 172) suggested that a sample size of 120.7031 (i.e. 121) was required in order to ensure .80 statistical power in evaluating the exact fit null hypothesis of the proposed EGB structural model. Furthermore, in evaluating the close fit null hypothesis of the EGB structural model, Preacher and Coffman's (2006) R software indicates that a sample size of 92.38281 (i.e. 92) is required to ensure statistical power of .80. Thus, the software developed by Preacher and Coffman (2006) proposed a sample size between 92 and 121.

b) The ratio of observations to freed parameters

Secondly, the current study approached the question of sample size from the perspective of the number of freed parameters in the model. The appropriate sample size can be determined by the ratio of sample size to the number of freed model parameters that need to be estimated (Theron, 2016g). Kline (2010) in accordance with Jackson (as cited in Kline, 2010), propose that sample size should be determined based on a *N:q* rule. While *N* refers to the number of cases, *q* refers to the number of parameters that require estimates (Kline, 2010). This size-to-parameter ratio is seen as the rule-of-thumb when determining the optimal sample size. The more extensive a model is the larger the sample size needs to be; as an elaborate model will have more latent variables and a large number of freed parameters that need to be estimated.

Bentler and Chou (1987, p. 91) indicate that the ratio should range between 5:1 and 10:1. Given that the factor loadings are sufficiently large and there are enough indicators per latent variable, a size-to-parameter ratio of 5:1 could be seen as appropriate (Bentler & Chou, 1987).

[24] The latent variables comprising the structural model were operationalised via 17 composite Y indicators (representing the seven endogenous latent variables) and 4 composite X indicators (representing the two exogenous latent variables. There are therefore 231 unique variance and covariance terms in the observed covariance matrix. There are 7 ψ, 5 γ, 11 β, 1 ϕ, 4λ^X, 4 θ_δ, 17 θ_ε and 10 λ^Y that were freed to be estimated. Therefore 59 parameters in the comprehensive LISREL model were freed to be estimated.

Nonetheless, Bentler and Chou (1987) also argue that a sample size to amount of parameters ratio of 10:1 or higher, is seen as more trustworthy. In contrast to Preacher and Coffman's sample size estimates obtained from the perspective of statistical power, the Bentler and Chou (1987) guideline proposed that the appropriate sample size for this study should range between 295 and 590 units of analysis (59 freed parameters).

c) Time, financial and logistic considerations

It can be argued that the above-mentioned considerations are too ambitious as they fail to recognise practical considerations when determining sample size. Lastly, the current study approached the question of the sample size from the perspective of the availability of resources. It was of extreme importance to consider the availability of time and finances, the necessary logistical arrangement, the availability of and access to participants and other resources required.

Taking into account the above-mentioned considerations, for the purpose of this study it was decided that a sample size of 200-300 participants/respondents should be selected to test the proposed EGB structural model.

3.5.3. Procedure used to invite participants to participate

In order to reach the desired sampling population, various organisations' head of HR departments were contacted to obtain informed institutional permission and to arrange the sampling and data collection process (see Appendix C). To ensure that every step complied with the ethical guidelines, strict ethical rules and principles have been followed. Data was gathered from participants through the use of an electronic questionnaire. The link to the questionnaire was sent out to participants via email (see Appendix B). Out of respect for employees' privacy, the distribution of questionnaires took place via the company's head of HR. The head of HR was approached and asked to forward this invitation email to the identified employees of each company. Informed consent was obtained from each invited participant (see Appendix A). The responses of participants that completed the questionnaire were anonymously returned to a database on the SUrvey/Checkbox platform housed by Stellenbosch University.

Unfortunately, only a limited number of organisations from the sampling population agreed to participate in the study and the desired sample size was not met. Consequently, at a later stage the Departmental Ethical Screening Committee (DESC) was approached to request permission to recruit participants via social media sites. This was done in an attempt to obtain

the largest sample size possible. The electronic questionnaire was also distributed via Facebook[25]. The hope was that this would assist in obtaining the required sample size.

3.6. MEASURING INSTRUMENTS

The fit of the proposed EGB model could only be analysed if there were measures to operationalise the latent variables in the model. The extent to which valid and credible conclusions were made of the validity of the EGB structural model based on the findings, depended on the extent to which the selected measuring instruments were reliable and construct valid measures of the identified latent variables. Operationalisation took place in the current study through the process of measurement (i.e. measured rather than experimental operational definitions were used). The latent variables in the EGB structural model were operationalised by creating two or more indicator variables for each endogenous and exogenous latent variable.

These indicator variables had to be proven to be reliable, unbiased, and valid measures of the specific exogenous and endogenous latent variables depicted in the EGB structural model. The trustworthiness of the findings on the validity of the structural model greatly depended on the validity and reliability of the measuring instruments used to measure the variables underpinning EGB. As SEM is used to evaluate the proposed structural model, according to Theron (2016e), there are three possibilities of how each latent variable in the EGB structural model could have been represented:

- Individual items could represent the latent variable.
- Item parcels could be formed by randomly combining items and calculating the means. Two or more item parcels thus represent the latent variables.
- Dimensions scores that are naturally calculated from the items could be used to represent the latent variable if the latent variable in question is multidimensional.

The second and third option were utilised in the current study.

The choice of the measuring instruments that were used to evaluate the hypotheses should be justifiable in terms of the chosen measures' validity, unbiasedness and reliability. Psychometric evidence on each instrument was gathered through the investigation of previously published research and analyses performed on hypotheses (Theron, 2016e). The majority of the instruments were self-developed or adapted from other measures. A few of

[25] A potential limitation of following the Facebook route is that this could have attracted participants who are not seen as employees, or participants who do not work in the private or public sector in South Africa. Hence, there is a possibility that the sample could include participants that do not form part of the target population and who do not meet the sample criteria of this study.

them were accessed from open sources, as these measures were available to the researchers in the public domain (i.e. already published).

The EGB questionnaire (Appendix B) also included a section with demographic questions. This was an additional section included to get more information about the participants in the sample so as to be able to characterize the sample that was eventually selected. The demographic questions pertained to age, gender, home language, highest level of education, current job level, and the name of the company respondents were currently employed at.

The following section discusses the nature and psychometric integrity of the measuring instruments from which the indicator variables were calculated that represented the latent variables of the proposed EGB structural model. The reliability and validity of the measuring instruments that were taken, as is, from published literature were evaluated using published research on these instruments to justify the selection and use of these instruments. The reliability and validity of the measuring instruments that were developed from scratch, or that were adapted from existing instruments, were evaluated as part of the current study based on the data collected on the instruments.

3.6.1. Employee Green Behaviour

EGB was conceptualised in terms of the extent that an individual is engaged in each of the five types of EGB namely; Taking Initiative, Working Sustainably, Conserving, Influencing Others, and Avoiding Harm (Ones & Dilchert, 2012a). According to McConnaughy (2014, p. 30), “due to the thorough critical incidents technique and process used to develop the Green Five Taxonomy, there is strong evidence that the taxonomy represents the breadth of possible EGBs.” The original Green Five Taxonomy was developed using a critical incidents methodology, and is measured on a 5-point Likert scale. Unfortunately, Ones and Dilchert’s (2009) EGB scale is unavailable to the public.

Based on the scale used by Robertson and Barling (2013), and Afsar, Badir and Kiani (2016, p. 83), a new scale was developed to measure all five dimensions of EGB (refer to section 2.3.4.). Similar to the Ones and Dilchert’s (2009) EGB scale, respondents were asked to indicate the frequency with which they engage in each of the five EGB dimensions (and the sixteen first-order EGBs). This was rated on a 5-point scale (1= never, 5= always), as well as a “not applicable” option. The mean score for each of the five sub-scales (Conserving, Taking Initiative, Influencing Others, Working Sustainably, and Avoiding Harm) of EGB represent the five indicator variables of EGB as a latent variable. Since EGB is multi-dimensional, five dimension scores were calculated to represent the EGB latent variable. Overall, the EGB scale consisted of 16 items.

3.6.2. Intention to Act Green

IAG was measured by asking participants how likely they are to engage in each of the five EGB dimensions. Participants' ratings are measured on a self-developed 5-point Likert scale (1= very unlikely, 2= unlikely, 3= neither, 4= likely, 5 =very likely). This scale was based on Fielding and Head (2012, p. 180) scale that measures IAG by asking respondents to rate how likely they are to engage in certain PEB. IAG was operationalised by creating two parcels to reflect employees' behavioural intention to engage in EGB. Two item parcels were calculated for the IAG latent variable by taking the mean of the even and uneven numbered items of the IAG scale to form two indicator variables. The IAG scale consisted of 5 items.

3.6.3. Perceived Behavioural Control

According to Ajzen (2002, p. 668) "perceived behavioural control can be measured by asking direct questions about the capability to perform a behaviour or indirectly on the basis of beliefs about ability to deal with specific inhibiting or facilitating factors." Control factors refer to any factors or circumstances that facilitate/enable or impede/inhibit employees' performance of the behaviour (Ajzen, 2006). The control factors used in the measure were identified as *Organisational policies and procedures, System/process factors, Nature of the job, Organisational Culture,* and *Hierarchical position in organisation (authority*).

According to Ajzen (2006, p. 6), "With respect to each salient control factor, items are formulated to assess the likelihood that the factor will be present and the factor's power to facilitate or impede performance of the behaviour". Hence, the items were adapted to measure respondents' perceived control over the different salient control factors (c_i) and the perceived power (p_i) of each of the salient control factors. In accordance with Ajzen's (2006) guidelines, perceived power (p_i) of the control factors was measured by assessing the power of each of the control factors/its ability to enable the respondent to engage in EGB on a 7-point scale (1= disagree, 7= agree). Perceived control over the control factors (c_i) was measured by asking respondents about the extent to which they have access to/ control over/ the availability of each of the control factors on a 7-point scale (1= unlikely, 7= likely).

These two components of PBC were combined multiplicatively over the set of salient control factors by calculating the sum. Two parcels were formed to serve as indicators of the latent variable PBC by summing the product of *perceived self-efficacy* and *perceived controllability* over the even and uneven numbered control factors respectively. Overall, the PBC scale consisted of 10 items.

3.6.4. Green Attitude

As previously mentioned in Chapter 2, Green Attitude is a combination of outcome evaluations (e_i) and behavioural beliefs (b_i) that EGB will result in the salient outcomes (Ajzen, 2006). Green Attitude was measured by using Ajzen's *TPB Questionnaire Construction* guidelines (Ajzen, 2006). The self-developed scale measures participants' outcome evaluations (e_i) and behavioural beliefs (b_i) with respect to different salient outcomes. The salient behavioural outcomes of EGB have been identified as *Work sustainably*; *Reduce the negative impact of organisational activities on the environment*; *Conserve and preserving resources*; *The green behaviour of others is influenced*; and *Initiating green programs and policies*.

The outcome evaluations (e_i) were measured on a 7-point scale, where respondents were asked to rate how bad (1) or good (7) each of the salient outcomes are in terms of engaging in EGB. Behavioural beliefs (b_i) were also measured on a 7-point scale, where respondents were asked to rate their belief strength (1= extremely unlikely, 7= extremely likely) that engaging in EGB will result in the different salient outcomes. This measure of Green Attitude included five items for each dimension (ten items in total). These two components of Green Attitude were combined multiplicatively over the set of salient behavioural outcomes by calculating the sum. By summing the product of outcome evaluations (e_i) and behavioural beliefs (b_i) over the even and uneven numbered behavioural outcomes respectively, two parcels were formed to serve as indicators of the latent variable Green Attitude. Overall, the Green Attitude scale consisted of 12 items.

3.6.5. Green Social Norm

Ajzen (2002) identifies *normative belief* and *motivation to comply* with the expectations of normative referents as the two components of Social Norm. With the help of Ajzen's *TPB Questionnaire Construction* guidelines (Ajzen, 2006), GSN was measured with a self-developed scale that measures participants' normative belief (Nb_j) and motivation to comply (Mc_j) with the expectation of normative referents. Normative referents with regards to GSN (in the work context) have been identified as *My manager/supervisor*; *My co-workers/colleagues*; *My spouse/partner and close family*; and *Green lobbyist groups*. These are individuals or groups that will approve or disapprove of participants if they engage in EGB (Francis *et al.,* 2004, p. 18).

Normative belief (Nb_j) was measured by asking respondents to rate how supportive/opposed each of the referent groups or individuals are to them engaging in EGB on a 7-point scale (1= extremely opposed, 7= extremely in favour/ supportive). Motivation to comply (Mc_j) was measured by asking respondents to rate the extent to which they want to comply with the expectations of each of the referents on a 7-point scale (1= not at all, 7= very much).

The section that measures GSN consisted of eight questions, four items for each of the two dimensions. These two aspects of GSN were combined multiplicatively over the set of salient reference groups by calculating the sum. Thus, to operationalise GSN, two indicator variables were calculated by summing *normative belief* and *motivation to comply* over the even and uneven numbered reference groups respectively. Overall, the GSN scale consisted of 8 items.

3.6.6. Moral Norm

The proposed EGB structural model is in agreement with Bamberg and Möser (2007) hypothesis that Moral Norm is seen as a direct determinant of behavioural intention. As mentioned in the literature review (Chapter 2), Moral Norm refers to the moral obligation that employees experience to engage in PEB or green actions. Two item parcels were developed for the Moral Norm latent variable by taking the mean of the even and uneven numbered items of the Moral Norm scale. Moral Norm was measured by using the 'Personal norms towards pro-environmental behaviour at work' measure of Ruepert *et al*. (2016, p. 62). Ruepert *et al*. adapted Steg and De Groot's (2012) scale to a 7-point scale (1= totally disagree, 7= totally agree). To ensure consistency in the EGB survey, the scale was adapted to refer to 'strongly' agree/ disagree; instead of 'totally' agree/ disagree. The adapted measure consists of four items, which include the following questions (Ruepert *et al*., 2016, p. 62):

> 'I feel guilty if I do not act pro-environmentally at work', 'I feel morally obliged to act pro-environmentally at work, 'I feel proud when I act pro-environmentally at work', and 'I would violate my principles if I would not act pro-environmentally at work'.

Ruepert *et al*. (2016, p. 62) contend that this scale has a high internal consistency (α= .84), and state that:

> ..we computed mean scores of items included in this scale (Total: M = 5.14, SD = 1.34; municipality in the Netherlands: M = 4.32, SD = 1.21, α = 0.84; university in Spain: M = 5.17, SD = 1.31, α = 0.84; public and waste water service provider in Romania: M = 5.14, SD = 1.36, α = 0.81; energy supplier in Italy: M = 5.85, SD = 1.05, α = 0.85). This shows that employees' feelings of moral obligation to behave pro-environmentally are rather strong.

3.6.7. Internal Attribution

Given the lack of valid and reliable instrument of Internal Attribution, a new instrument was created to measure this variable. As previously mentioned in the literature review, Internal Attribution is the extent to which individuals attribute the outcome of an event or behaviour to internal personal factors or attributes. A measuring instrument has been developed to measure Internal Attribution on a 5-point scale (1= disagree, 5= agree). The self-developed scale consists of 6 items. Internal Attribution was operationalised with two item parcels created randomly from the items of the self-developed Internal Attribution scale.

3.6.8. Problem Awareness

As mentioned in Chapter 2, Problem Awareness refers to an individual's knowledge and awareness of environmental issues and concerns. Blok *et al.* (2015) define environmental awareness as knowledge of environmental and recognition of environmental problems. Based on the scale of Steg (1999), as used by Afsar *et al.* (2016, p. 83) and Gatersleben, Steg and Vlek (2002, p. 343), Problem (Environmental) Awareness was measured on an 11-item scale proposed by Blok *et al*. (2015). The items were scored on a 5-point scale (1= strongly disagree; 5= strongly agree). It is noted that the last four items are negatively keyed items. The survey questions for environmental awareness as developed by Blok *et al*. (2015) are shown in Table 3.2.

Table 3.2.
Questions that measure Environmental Awareness

Environmental Awareness Survey Questions (variable)
Environmental pollution affects my health
Environmental problems have consequences for my life
I worry about environmental problems
I can see with my own eyes that the environment is deteriorating
Environmental problems are a risk for the future of my children
A better environment starts with myself
People who do not take the environment into account try to escape their responsibility.
Environmental problems are exaggerated (R)
Too much attention is paid to environmental problems (R)
The attention given to the greenhouse effect is exaggerated (R)
Saving threatened species is unnecessary luxury (R)

(Blok *et al*., 2015, p. 64)

Blok *et al*. (2015) developed a survey on PEB and tested it on university employees. According to Blok *et al*. (2015), the scale for environmental awareness has a Cronbach alpha of .85 (exceeding the criterion of .70), indicating good scale reliability. Further data analysis confirmed that discriminant validity is not a problem, as the correlations between the constructs are well below the threshold value of .80 (Blok *et al*., 2015). Two item parcels were calculated by taking the mean of the even and uneven numbered items of the Problem Awareness scale to form two composite indicator variables for the Problem Awareness latent variable in the structural model.

3.6.9. Rewards and Recognition

Cantor, Morrow and Montabon (2012) measure employee perception of rewards (provided by the company for involvement in) for pro-environmental workplace behaviour through a 7-point response format (1 =very inaccurate, 7 =very accurate). Cantor *et al*. (2012) contend that the measure has good reliability as it has a Cronbach alpha of .873 (exceeding .70) and sufficient construct reliability (.962). By taking the mean of the uneven and even numbered items of their scale, two item parcels were used to represent the latent variable of Rewards and Recognition. Illustrated bellow in Table 3.3., the scale comprises of three items.

Table 3.3.
Questions that measure Employee Perception of Rewards for Employee Green Behaviour

Rewards and Recognition for EGB Survey Questions
I am recognised for keeping up with the latest environmental developments in my field.
I am rewarded for performing work that has a positive environmental impact on both the firm and society.
I am recognised for exhibiting positive attitudes toward my company's environmental objectives.

(Cantor *et al*., 2012, p. 50)

3.6.10. Indicator Variables

Table 3.4. indicates the latent variables in the revised EGB structural model (Figure 3.1.) and the number of composite indicator variables that were used to operationalise each.

Table 3.4.
Representation of the latent variables via indicator variables in the employee green behaviour structural model

Latent variable	Number of indicators per latent variable
PBC	2
Problem Awareness	2
Internal Attribution	2
GSN	2
Green Attitude	2
Moral Norm	2
IAG	2
Rewards and Recognition	2
EGB	5
Total	21

3.7. STATISTICAL ANALYSIS

The analysis technique that was used depended on the statistical hypotheses, research design and the nature of the substantive hypothesis. The statistical analysis techniques and the motivation for each will be discussed in further detail below. For the purpose of this study, structural equation modelling (SEM) was used to test the measurement and comprehensive LISREL models' absolute and relative fit, and in both cases model fit has been tested via LISREL 8.8 (Du Toit & Du Toit, 2001; De Goede & Theron, 2010).

Item analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was used to analyse the data obtained on the selected instruments and to examine the success with which the indicator variables represent the latent variables in the proposed EGB structural model.

3.7.1. Item Analysis

Item analysis is a technique used in the attempt to achieve the ideal that all variance in the X/Y indicator variables are only due to variance in the latent variables ξ/ η (Theron, 2016e). Item analysis attempts to identify and remove (or salvage) poor items by detecting unreliable and invalid items. Consequently, poor items were either deleted or revised. Item analysis has been conducted to determine the internal consistency of the items of the various measuring instruments. Thus, this was done to determine to what extent variance in the items had a systematic (but not necessarily unidimensional) source. High internal consistency reliability would therefore only imply that the satisfactorily large proportion of the variance in the observed scores had a systematic (but not necessarily unidimensional) source of variance. High internal consistency reliability moreover is a necessary but not sufficient condition to conclude that the items successfully reflect the latent variable of interest. Item analysis has been done on each subscale used to measure the latent variables in the proposed EGB structural model separately. After the treatment of missing values, an item analysis was again performed on the data by using SPSS (SPSS version 25).

3.7.2. Dimensionality Analysis

Dimensionality analysis, through EFA, was performed on each of the selected subscales. EFA departs from the position that it is not known how many factors are measured by the items comprising the subscale. Strictly speaking this is not true for any of the instruments that were used in the current study. Specific design-intentions guided the development of each subscale. The intention in each case was that the items comprising the subscale would measure a unidimensional construct or unidimensional latent dimension of a construct. A confirmatory, hypothesis testing factor analytic approach strictly speaking would therefore have been more

appropriate. An EFA approach was, however, chosen over a CFA approach in the interest of expediency. This decision is acknowledged as a methodological limitation.

The inter-item correlation matrix indicates to what degree items correlate with each other and share a common source of variance. The purpose of the EFA was to determine the number of common underlying factors that need to be assumed and the factor loadings that need to be assumed to satisfactorily explain the pattern of observed inter-item correlations in the correlation matrix. The expectation was that the EFA would indicate that only a single common underlying factor needed to be assumed to accurately reproduce the observed inter-item correlation matrix calculated for each subscale to measure a unidimensional latent dimension of a multidimensional latent variable or scale designed to measure a unidimensional latent variable. The purpose of the EFA was to confirm the assumption of unidimensionality, to remove items with weak factor loadings and to confirm the assumption that the target latent variable explains a significant proportion of variance observed in each item. SPSS (SPSS version 25) was used to perform the dimensionality analyses performed for each subscale separately.

3.7.3. Evaluation of Statistical Assumptions

As previously mentioned, this study followed an *ex post facto* research design with SEM. SEM makes various statistical assumptions, such as that missing values have been appropriately treated, that the estimation method is appropriate given the variable type, and that the multivariate indicator distribution is multivariate normal in the parameter. This will be evaluated below.

3.7.3.1. Missing Values

As with most quantitative research, the ideal of a complete dataset is highly improbable. An incomplete dataset contains various missing values. Acock (2005) describes three types of mechanisms that can produce missing values, namely missing completely at random (MCAR), missing at random (MAR), and nonignorable (NI) missing values. As the issue of missing values is inevitable, also in the current study, steps had to be taken to address this problem. There are five techniques that can be used to address the issue of missing values, namely (Carter, 2006):

1) list-wise deletion
2) pairwise deletion
3) full information maximum likelihood (FIML) estimation
4) imputation by matching
5) multiple imputations (MI)

List-wise deletion, or complete case analysis, is seen as an *ad hoc* method that deals with missing values before any analyses are done (Carter, 2006). List-wise deletion of cases involves identifying and removing cases from the dataset when they are seen as incomplete when any of the items have missing values. The advantage of this method is its simplicity and ease of implementation, while its disadvantage is that the sample size available for data analysis can drastically reduce (Carter, 2006; Pigott, 2001).

Pairwise deletion, or available case analysis**,** only entails deleting cases for analysis on variables that are used in the specific analysis where values are missing (Dunbar-Isaacson, 2006). According to Carter (2006), this method assumes that the data are MCAR. For each pair of variables, pairwise deletion calculates the covariance estimates for all cases where complete observations on both variables are available (Wothke, 1998 as cited in Carter, 2006, p. 4). According to Pigott (2001), it can be seen as problematic that this method can produce implausible estimated covariance matrices because it makes use of varying samples to estimate parameters (Dunbar-Isaacson, 2006). Pigott (as cited in Dunbar-Isaacson, 2006) further asserts that both list-wise and pair-wise deletion are not recommended methods unless the amount of missing data is small and MAR can be assumed to hold, as they are both likely to yield biased estimates.

According to Pigott (2001), the **Full Information Maximum Likelihood (FIML) estimation** technique is an iterative solution as it uses the expectation maximization (EM) algorithm to uncover the estimate of a parameter when the option for maximization likelihood is not possible. FIML computes a case-wise likelihood function using only those variables that are observed for specific cases (Dunbar-Isaacson, 2006). Maximum likelihood with the EM algorithm does not provide values for individual missing variables, but rather "estimates for the means and the variance-covariance matrix of the variables of interest" (Pigott, 2001, p. 368). These parameter estimates are then used to obtain model parameters such as the coefficients of a linear regression model.

Imputation by matching entails a process of substituting real values for missing values (De Goede & Theron, 2010; Dunbar-Isaacson, 2006). Pattern matching is when "the missing score is replaced with a score from another subject who has a similar profile of scores across the other variables" (Carter, 2006, p. 4).

Although **Multiple Imputations (MI)** can also be seen as an *ad hoc* method, it differs from the other methods in that "multiple imputations do not have to be MCAR but instead need only meet the less rigorous assumption that the missing data are missing at random (MAR)" (Carter, 2006, p. 5). According to Piagott (2001, p. 370), MI is a process where estimates of the missing values are obtained, and not the expected values of the sufficient statistics. MI

was used to treat the problem of missing values in the current study it retains the complete data of all observations. MI has the assumption that the data is continuous (rather than ordinal) and assumes multivariate distribution.

For the purpose of this research study, missing values were minimised by designing the self-administered web-based online survey in a manner that requires the individual participants to respond to all of the items. The response alternatives nonetheless did offer the possibility of responding with “unable to respond” which was then coded as a user-defined missing value. The decision on which of these missing value treatment techniques to use were made only after the data collection had been terminated and the nature and extent of the missingness had been examined.

3.7.3.2. Variable Type

SEM has been conducted on the proposed EGB structural model by using item parcels and dimension scores. The indicator variables were thus seen as continuous variables. In the case of continuous indicator variables, LISREL uses the maximum likelihood estimation (MLE) technique by default to analyse the covariance matrix. As the data is treated as continuous, and not discrete (ordinal), the covariance matrix was analysed (and not the polychoric correlation matrix) (Jöreskog & Sörbom, 1996).

3.7.3.3. Multivariate Normality

The MLE method that is used by default when analysing continuous data assumes that the indicator variables follow a multivariate normal distribution (Theron, 2016f). As mentioned above, LISREL uses the MLE technique by default to obtain estimates for the freed model parameters and assumes that the indicator variables follow a multivariate normal distribution. This assumption of univariate and multivariate normality was first tested through PRELIS (Jöreskog & Sörbom, 1996). Multivariate normality affects the credibility of the fit test and the tests of the significance of the parameter estimates when using MLE.

The decision on whether to attempt normalisation, whether to analyse the original data or the normalised data and whether to use MLE or rather robust maximum likelihood (RML) estimation was based on the outcome on the test for multivariate normality. RML is a form of MLE but is more appropriate for data that is not normally distributed.

3.7.4. Confirmatory Factor Analysis (CFA)

As part of the evaluation of the construct validity of the scales designed to measure multidimensional latent variables included in the reduced EGB structural model, the measurement models in which the latent dimensions of the multidimensional latent variables were structurally mapped onto the items that were designated to reflect these latent

dimensions were fitted via confirmatory factor analysis (CFA). Only one scale in the composite research questionnaire, namely, the Employee Green Behaviour scale was purposely developed to measure a multidimensional construct. The measurement model implied by the constitutive definition of EGB combined with the design intention of the scale was consequently fitted via CFA.

Prior to evaluating the fit of the structural model by fitting the comprehensive LISREL model, the measurement model fit, in which the latent variables comprising the structural model were structurally mapped onto the composite indicators that were designated to reflect them, was evaluated by conducting a CFA. The measurement model was fitted via CFA, to assess the success with which the EGB latent variables have been operationalised via the item parcels (De Goede & Theron, 2010). LISREL 8.8 was used to fit the CFA model to the data. The interactive process of drawing a path diagram and deriving the SIMPLIS syntax from that was used in LISREL to fit the CFA model to the data (Du Toit & Du Toit, 2001).

Operationalisation was seen as successful if the measurement model reflecting the design intention and constitutive definition of the latent variable at least shows close fit (i.e. if the close fit null hypothesis was not rejected). Operationalisation was in addition seen as successful if the (unstandardised) factor loadings (lambda estimates) were statistically significant ($p<.05$), the (completely standardised) factor loadings were large, the (unstandardised) error variances were statistically significant ($p<.05$), and the(completely standardised) measurement error variances were small and the inter-latent variable correlations (ϕj_k) were not approaching unity (Theron, personal communication, August 10, 2016). In terms of CFA, the critical cut-off value for factor loadings to be considered satisfactory is when $\lambda_{ij} >.71$ in the completely standardised solution. This critical cut-off value was used to interpret the factor loadings of the item parcels in the measurement model. Small error variance (theta-delta, $\theta_{\delta jj}$) was preferred (with a critical value ≤.50), implying that less than 50% of the indicator variable variance was due to measurement error.

CFA was used to evaluate measurement model fit, as it produces the series of LISREL model fit indices used to determine how the measurement model fits the observed data (Du Toit & Du Toit, 2001). The measurement model fit indices will be discussed in more detail below.

3.7.4.1. Evaluating measurement model fit

According to Theron (2016e), “the fit of the measurement model reflecting the constitutive definition of the construct’s stance on the internal structure and the design intention of the developers of the instrument will be evaluated through SEM.” Measurement model fit refers to the ability of the fitted model to reproduce the observed covariance matrix. The model fits well

if the reproduced covariance matrix approximates the observed covariance matrix. The tests of close fit and exact fit were interpreted to assess the fit of the measurement model. Exact measurement model fit in the parameter was tested by testing H_{018a}: RMSEA=0 against H_{a18a}: RMSEA≥0. Close measurement model fit in the parameter was tested by testing H_{018b}: RMSEA≤.05 against H_{a18a}: RMSEA>.05. H_{018a} was tested via the exceedance probability associated with the Satorra-Bentler chi-square statistic whereas H_{018b} was tested by determining the conditional probability associated with the sample RMSEA estimate given that H_{018b} is assumed to be true.

The basket of fit statistics calculated for the sample were interpreted to form a clinically weighted assessment of the model fit in the sample. According to Diamantopoulos and Siguaw (2000), RMSEA <.05 indicates good model fit, values between .05 and .08 indicate reasonable fit, values between >.08 and <.1 indicate mediocre fit, and values >.1 indicates poor model fit.

3.7.4.1.1. Interpreting residual covariances

The difference between the observed and expected covariances were interpreted to further assess the model fit. According to Diamantopoulos and Siguaw (2000) standardised residuals can be interpreted as standard normal deviates and are considered large when they are equal to or larger than 2.58 (Myburgh, 2013). Large residuals indicate that the model either overestimates (large negative residuals) or underestimates (large positive residuals) the covariance between certain observed and expected variables, suggesting poor model fit. According to Myburgh, (2013, p. 154), “large standardized residuals are an indication of covariance (or the lack of covariance) between indicator variables that the model fails to explain.” The percentage of large standardised residuals was calculated and used to comment on the fit of the measurement model.

3.7.4.1.2. Interpreting modification indices

An analysis of the standardised residuals could suggest that additional paths can improve the fit of the model. LISREL calculates modification indices that suggest parameters, if freed, that could improve the model fit. An examination of the modification indices calculated for the factor loading matrix (lambda matrix) and the theta-delta matrix could indicate suggested paths that will have a statistically significant positive impact on the model fit (p<.01). Parameters that will statistically significantly (p<.01) improve the fit of the model when they are freed, are those with large chi-square values larger than the critical chi-square value of 6.6349 on a 1% significance level and at one degree of freedom (Myburgh, 2013). The intention with this was not, however, to modify the measurement model but rather to gain additional insight in the fit of the model. The percentage of large modification index values was calculated for Λ^x and θ_δ.

A large percentage of large modification indices was considered to comment negatively on the fit of the model.

3.7.4.2. Interpretation of the measurement model parameter estimates

The parameter estimates of the measurement model were interpreted to identify any parameters that might detract from the validity of the composite indicator measures used to operationalise the latent variables comprising the structural model. If the slope of the regression of X on ξ in the fitted measurement model was substantial and statistically significant ($p<.05$), the measure was considered to provide a valid reflection of a specific latent variable (Diamantopoulos & Siguaw, 2008). Conditional on a finding of exact or close measurement model fit (i.e. H_{018a} and/or H_{018b} was not rejected), the following factor loading null hypotheses, measurement error variance null hypotheses, as well as the latent variable covariance null hypotheses, were evaluated and tested:

H_{0i}: $\lambda_{jk}=0$; i=19, 20, …, 39; j=1, 2, …, 21; k=1, 2, …, 9

H_{ai}: $\lambda_{jk}\neq 0$; i=19, 20, …, 39; j=1, 2, …, 21; k=1, 2, …, 9

H_{0i}: $\Theta_{\delta jj} = 0$; i =40, 41,...., 60; j=1, 2....., 21

H_{ai}: $\Theta_{\delta jj} > 0$; i =40, 41,..., 60; j=1, 2....., 21

H_{0i}: $\phi_{jk} = 0$; i =61, 62..., 96; j=1, 2....,9; k=1, 2....,9; j≠k

H_{ai}: $\phi_{jk} > 0$; i =61, 62..., 96; j=1, 2....,9; k=1, 2....,9; j≠k

The discriminant validity of the latent variable inferences derived from each set of indicator variables were finally also evaluated.

3.7.4.3. Discriminant analysis

Discriminant validity refers to the success with which the latent variables can be distinguished from each other via their observed scores. The discriminant validity of the latent variable inferences derived from each set of indicator variables were evaluated. The phi matrix (ϕ_{jk}) returned by the CFA was examined as it refers to the correlation between the latent variables. The ϕ_{jk} estimates were seen as statistically significant ($p<.05$) when $|z|\geq 1.6449$[26]. When any ϕ_{jk} estimate exceeded .90, the estimate was flagged as the correlation size was considered troublesome. If the latent variables correlated too high, the issue of discriminant validity becomes a problem as it suggests that the composite indicator measure failed to clearly distinguish between the latent variables. The 95% confidence intervals were in addition

[26] As reflected by the alternative hypotheses positive correlations were expected to exist between the 9 latent variables comprising the structural model. The inter-latent variable correlation null hypotheses were therefore tested via one-tailed tests against directional alternative hypotheses.

calculated for each ϕ_{jk} estimate using an Excel macro developed by Scientific Software International (Mels, 2010). If the confidence interval included unity a problem with discriminant validity was indicated.

3.7.5. Fitting the Structural Model

Conditional on the satisfactoriness of the fit of the measurement model, the comprehensive LISREL model fit (the combined measurement and structural model) was tested. The covariance matrix was analysed to fit the comprehensive LISREL model. LISREL 8.8 was used to test the exact and close null hypotheses (H_{01a} and H_{01b}) regarding the comprehensive LISREL model fit in the parameter.

3.7.5.1. Evaluating structural model fit

Satisfactory model fit was determined by testing the statistical null hypotheses for exact (H_{01a}) and close (H_{01b}) model fit for the comprehensive LISREL model. The exceedance probability associated with the Satorra-Bentler/the Normal Theory Weighted Least Squares Chi-Square statistic[27] was interpreted to evaluate whether the test statistic was not statistically significant ($p>.05$) and whether the exact fit null hypothesis (H_{01a}) cannot be rejected. If the exact fit null hypothesis is not rejected, the discrepancy between the observed and reproduced covariance matrices observed in the sample can be explained in terms of sampling error only.

The conditional probability of observing the sample RMSEA estimate under the close fit null hypothesis was used to test the close fit null hypothesis (H_{01b}). If the close fit null hypothesis is not rejected ($p>.05$), it indicates that the position that the model fits the data on the parameter approximately is a tenable position. A finding of close fit warranted the interpretation of the comprehensive model parameter estimates. If the measurement model fitted that data and the structural model also fitted the data, it implies that the structural model fitted the data. This inference derived from the combined finding of measurement and comprehensive LISREL model fit warranted the interpretation of the structural model parameter estimates. This entailed that the specific gamma and beta path coefficient hypotheses listed in Table 3.1 were tested.

3.7.5.1.1. Interpreting residual covariances

Apart from the basket of evidence of fit indices, the standardised residuals were also interpreted to assess the comprehensive model fit. Standardised residuals can be considered large when they are larger than 2.58 or -2.58. Large residuals indicate either overestimation or underestimation, indicating a need to get rid of, or add paths. The standardised residuals

[27] The outcome of the test of multivariate normality will determine which of these two fit statistics was used to test the hypothesis of exact structural model fit.

in the LISREL output were at this stage examined not to identify any specific suggestions for possible model modification, but rather to comment on the fit of the comprehensive LISREL model. The percentage of large standardised residuals was again calculated.

3.7.5.1.2. Interpreting modification indices

An analysis of the standardised residuals could suggest that additional paths will improve the fit of the proposed EGB structural model (De Goede & Theron, 2010). The modification indices calculated by LISREL for the $\mathbf{B}$, $\mathbf{\Gamma}$ and $\mathbf{\Psi}$ matrices were examined to determine if the suggested paths in the output file will significantly improve the fit of the model. To improve the model fit, modification indices should be large (≥6.64). The intention was not to modify the comprehensive model but rather to gain additional insight into the fit of the model. The percentage of large modification index values were calculated for the $\mathbf{B}$, $\mathbf{\Gamma}$ and $\mathbf{\Psi}$ matrices. A large percentage of large modification indices commented negatively on the fit of the model.

3.7.5.2. Interpretation of the structural model parameter estimates

The interpretation of the structural model parameter estimates was conditional on achieving at least close fit for the comprehensive LISREL model. To interpret the significance of the gamma and beta's the unstandardised matrices were examined. The magnitude of the statistically significant gamma and betas was interpreted in the completely standardised solution as the average standard deviation change in η associated with one standard deviation change on the ξ or η.

The statistical significance ($p<.05$) of both the β and γ parameter estimates was investigated to determine if the path coefficient null hypotheses had to be rejected or not. The signs associated with the significant β and γ parameter estimates had to be consistent with the nature of the hypothesised relationship between the two latent variables to allow the rejection of the null hypothesis (De Goede & Theron, 2010). The magnitude and sign of the completely standardised beta and gamma estimates indicated the strength and nature of the relationship that one latent variable has on another.

3.7.5.3. Discussion of possible structural model modification

Proposed modifications to the model suggested by the modifications calculated for $\mathbf{\Gamma}$ and $\mathbf{B}$ were only considered in the derivation of data-driven suggestions for future research if they made logical sense and can be theoretically supported. The magnitude of the completely standardised change had to warrant the freeing of the proposed parameters (≥6.64), as well as the parameter estimate's sign.

CHAPTER 4

ETHICAL RISK EVALUATION AND ETHICAL SCREENING

"If all the insects were to disappear from the earth, within 50 years all life on earth would end.
If all human beings disappeared from the earth, within 50 years all forms of life would flourish."
-Jonas Salk

4.1. EVALUATION OF ETHICAL RISKS

The potential ethical risks associated with the research study as outlined in this thesis, were assessed in order to protect the dignity, rights, safety and well-being of the research participants that were involved in this study (Research Ethics Committee: Human Research (Humanities), 2012).

The participants were not exposed to any risks or discomfort related to completing the questionnaire. The only potential discomfort was that the questionnaire took up approximately 25 minutes of participants' time to complete. All electronic questionnaires were answered anonymously, and participants' names and identities were not (and are not to be) disclosed. The data was be protected from unauthorised access by storing it on a password-protected computer. Only aggregate statistics of the sample were reported. The identity of the participants was never revealed and will remain confidential.

Annexure 12 of the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006) requires psychologists that are doing research to enter into an agreement with the participants. This agreement should cover the nature of the research and the responsibilities of both the participants and the researcher. The agreement in terms of which the research participant provides informed consent should meet the following requirements according to Annexure 12 (Republic of South Africa, 2006, p. 42):

> 89. (1) A psychologist shall use language that is reasonably understandable to the research participant concerned in obtaining his or her informed consent.
> (2) Informed consent referred to in subrule (1) shall be appropriately documented, and in obtaining such consent the psychologist shall –
> (a) inform the participant of the nature of the research;
> (b) inform the participant that he or she is free to participate or decline to participate in or to withdraw from the research;
> (c) explain the foreseeable consequences of declining or withdrawing;
> (d) inform the participant of significant factors that may be expected to influence his or her willingness to participate (such as risks, discomfort, adverse effects or exceptions to the requirement of confidentiality);
> (e) explain any other matters about which the participant enquires;
> (f) when conducting research with a research participant such as a student or subordinate, take special care to protect such participant from the adverse consequences of declining or withdrawing from participation;

> (g) when research participation is a course requirement or opportunity for extra credit, give a participant the choice of equitable alternative activities; and
> (h) in the case of a person who is legally incapable of giving informed consent, nevertheless –
> (i) provide an appropriate explanation;
> (ii) obtain the participants assent; and
> (iii) obtain appropriate permission from a person legally authorized to give such permission.

Research participants were given the right to voluntarily decide whether or not to accept the invitation to participate in the research study. In order for participants to make an informed decision, the informed consent form informed participants of the objective and purpose of the research study; what their participation involved; how the results will be compiled/distributed and used; who the researchers are; what their affiliation is, what the participant's rights are; and where they can obtain further information on their research rights (Research Ethics Committee: Human Research [Humanities], 2012). The researcher obtained informed consent from the participants (this informed consent form can be found in Appendix A). The informed consent formulation was presented as part of the electronic questionnaire, so as to electronically record that the invited individuals consented to his/her participation.

Furthermore, informed institutional permission for the research was obtained from the participating organisations. The permission letter was submitted to the Departmental Ethics Screening Committee (DESC). Annexure 12 in the Ethical Rules of Conduct for Practitioners Registered under the Health Professions Act (Act no. 56 of 1974) (Republic of South Africa, 2006, p. 41) requires of the psychological researchers to obtain institutional permission from the organisation involved in the research study:

> A psychologist shall-
> (a) obtain written approval from the host institution or organisation concerned prior to conducting research;
> (b) provide the host institution or organisation with accurate information about his or her research proposals; and
> (c) conduct the research in accordance with the research protocol approved by the institution or organisation concerned.

Formal written informed institutional permission had been obtained from all participating organisations. Copies of these have been submitted to the Research Ethics Committee Human Research. An application for ethical clearance of the proposed research study was submitted to the Research Ethics Committee Human Research (Humanities) of Stellenbosch University. Ethical clearance for this study was granted from the Research Ethics Committee Human Research.

CHAPTER 5
RESEARCH RESULTS

5.1. INTRODUCTION

The objective of Chapter 5 is to present and discuss the results of the statistical analyses that were performed in the current study. The statistical analyses were performed to evaluate the validity of the overarching substantive research hypothesis and the path specific substantive research hypotheses. The characteristics of the research sample are described first. The credibility of the verdict on the research hypotheses hinges on the reliability and validity with which the latent variables comprising the hypothesised EGB structural model have been operationalised. The item analysis results as well as the dimensionality analysis results are subsequently discussed. After that, the results of the single-group CFA analysis are presented, including the results of the tests for multivariate normality performed on the composite indicator variables. Finally, the results of the single-group structural equation modelling, in which the comprehensive EGB LISREL model is evaluated, are presented.

5.2. DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

The sample consisted of employees employed in the public and private sector in South Africa. Originally, in Chapter 3, it was decided on a sample size of 200-300 respondents. The final sample size consisted of 221 complete responses.

Officially, 8 different organisations participated in the study. Each of these varied in size, industry, demographics, and the extent to which they support and encourage green behaviour. In order to maintain strict confidentially, none of the participating organisations will be identified. It was however found that 71.5% of the respondents came from three different organisation (36.2%; 24%; 11.3%). The rest of the respondents (28.5%) are/were employed at various other organisations. Additional participants (obtained via Facebook), were employed at various organisations in South Africa.[28]

Demographic information was obtained from the sample and is depicted in Table 5.1. The majority of the sample were rather young (between 18-39 years old). The findings indicate that the majority of respondents were female (60.2%). Out of the sample, the most of respondents were either English or Afrikaans speaking (44.3%; 38.5%). Considering the highest level of education of the respondents, the highest percentage had a Bachelor's Honours Degree/Postgraduate Diploma (29.4%). Generally, the sample seems to be representative of

[28] The research questionnaire did not record whether participants were invited via Facebook or via an internal organisational email.

different levels of education. The majority of the sample respondents were non-managerial staff (49.3%), with fewer upper level managerial staff (8.1%).

Table 5.1.

Demographic characteristics of the final sample

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-29	72	32.6	32.7	32.7
	30-39	86	38.9	39.1	71.8
	40-49	34	15.4	15.5	87.3
	50-59	22	10.0	10.0	97.3
	60-69	6	2.7	2.7	100.0
	70+	0	0	0	
	Total	220	99.5	100.0	
Missing	System	1	.5		
Total		221	100.0		

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	133	60.2	60.5	60.5
	Male	87	39.4	39.5	100.0
	Other	0	0	0	
	Total	220	99.5	100.0	
Missing	System	1	.5		
Total		221	100.0		

Home language					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Afrikaans	85	38.5	38.6	38.6
	English	98	44.3	44.5	83.2
	Sepedi	6	2.7	2.7	85.9
	Sotho	2	.9	.9	86.8
	Swati	1	.5	.5	87.3
	Tsonga	5	2.3	2.3	89.5
	Tswana	3	1.4	1.4	90.9
	Xhosa	9	4.1	4.1	95.0
	Zulu	7	3.2	3.2	98.2
	Other	4	1.8	1.8	100.0
	Venda	0	0	0	
	Ndebele	0	0	0	
	Total	220	99.5	100.0	
Missing	System	1	.5		
Total		221	100.0		

Highest level of education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Higher Certificate / Advanced National Certificate	37	16.7	16.8	16.8
	Diploma / Advanced Certificate	39	17.6	17.7	34.5
	Bachelor's Degree (3 years) / Advanced Diploma	44	19.9	20.0	54.5
	Bachelor's Honours Degree/ Postgraduate Diploma	65	29.4	29.5	84.1
	Master's Degree	32	14.5	14.5	98.6
	Doctoral Degree	3	1.4	1.4	100.0
	Total	220	99.5	100.0	
Missing	System	1	.5		
Total		221	100.0		

Table 5.1.

Demographic characteristics of the final sample (continued)

Current job level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-managerial	109	49.3	49.5	49.5
	Lower level managerial	36	16.3	16.4	65.9
	Middle level managerial	57	25.8	25.9	91.8
	Upper level managerial	18	8.1	8.2	100.0
	Total	220	99.5	100.0	
Missing	System	1	.5		
Total		221	100.0		

5.3. MISSING VALUES

As previously mentioned, the EGB (electronic) questionnaire was designed in a manner that requires participants to respond to all of the items. Consequently, there were no incomplete responses (missing values) in the sense that a respondent failed to choose a response option. Nonetheless, the response alternatives offered the possibility of responding with a “not applicable” option. This was then coded as a user-defined missing value. Multiple Imputation (MI) was the preferred method used to solve the problem of missing values in the current study. One advantage of this technique is that it retains the complete dataset. MI is based on the assumption that the data is continuous and follows a multivariate normal distribution.

The distribution of missing values per item is shown in Table 5.2. MI (via PRELIS) was conducted on the sample of two hundred and twenty-one (N = 221) complete responses. Missing values constituted only 1.86 percent of the total data set [317/ (221*77) = 1.86%]. Hence, there is no excessive missingness (<30%). The number of missing values per item shown in Table 5.2. sum to 317 across the 77 items. In total there were 221 x 77= data points of which 317 were missing. No cases were deleted since MI was utilised.

The imputed data set was utilised during item analysis and EFA performed in SPSS 25 (SPSS, 2018).

Table 5.2.

Number of missing values per item

Q3	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**
1	16	11	3	1	22	3
Q10	**Q11**	**Q12**	**Q13**	**Q14**	**Q15**	**Q16**
0	0	1	0	0	3	4
Q17	**Q18**	**Q19**	**Q20**	**Q21**	**Q22**	**Q23**
3	11	5	6	1	1	3
Q24	**Q25**	**Q26**	**Q27**	**Q28**	**Q29**	**Q30**
11	10	4	4	9	7	7
Q31	**Q32**	**Q33**	**Q34**	**Q35**	**Q36**	**Q37**
7	5	6	4	3	2	3
Q38	**Q39**	**Q40**	**Q41**	**Q42**	**Q43**	**Q44**

Table 5.2.

Number of missing values per item (continued)

2	2	3	4	3	3	4
Q45	**Q46**	**Q47**	**Q48**	**Q49**	**Q50**	**Q51**
4	2	2	2	4	6	2
Q52	**Q53**	**Q54**	**Q55**	**Q56**	**Q57**	**Q58**
18	3	6	3	14	4	4
Q59	**Q60**	**Q61**	**Q62**	**Q63**	**Q64**	**Q65**
3	6	5	4	1	1	1
Q66	**Q67**	**Q68**	**Q69**	**Q70**	**Q71**	**Q72**
1	4	1	2	2	1	1
Q73	**Q74**	**Q75**	**Q76**	**Q77**	**Q78**	**Q79**
1	2	2	2	2	2	2

5.4. ITEM ANALYSIS

The objective of the item analysis was to attempt to identify and remove (or salvage) poor items by detecting unreliable and invalid items. Item analysis was performed via the SPSS Reliability Procedure (SPSS, 2018) and allowed the identification and elimination of items not contributing to an internally consistent description of the various latent dimensions comprising the construct in question (Theron, 2016a). The purpose of item analysis was to determine the internal consistency of the items of the various measuring scales and subscales that were designed to measure the unidimensional constructs or unidimensional latent dimensions of multidimensional constructs comprising the EGB structural model. High internal consistency reliability is a necessary, but not sufficient, condition to conclude that the items successfully reflect the latent variable of interest.

The objective with the construction of the composite research questionnaire was to construct sets of items that validly and sensitively reflect relatively small differences in the unidimensional constructs or unidimensional latent dimensions of multidimensional constructs comprising the EGB structural model. To the extent that this objective was realised, the classical measurement theory item statistics will be characterised by a high coefficient of internal consistency, the absence of items with extreme means (and consequently no truncated item distributions), no items with small (outlier) item standard deviations, no items that consistently correlate below the mean inter-item correlation with the remaining items, no items with small (outlier) corrected item-total correlations, no items with small (outlier) squared multiple correlations and no items that, when deleted, increase the scale/subscale Cronbach's Alpha. To the extent that the objective was not achieved for specific items this will be unambiguously reflected in the item statistics. It can nonetheless not conversely be conclusively argued that when the classical measurement theory item statistics return the foregoing results that the intended unidimensional construct or intended unidimensional latent

dimension of the multidimensional construct of interest had been validly and sensitively measured. Under such an outcome the position that the intended unidimensional construct or intended unidimensional latent dimension of the multidimensional construct of interest had been validly and sensitively measured merely becomes a permissible and plausible position to hold.

The two subscales respectively associated with the latent variables Green Social Norm (GSN), Perceived Behavioural Control (PBC), and Green Attitude were not item analysed. GSN was measured by measuring the two components that combine multiplicatively across the salient reference groups to shape the perceived social norm to act green, namely the Normative belief (Nb_j) that the jth referent group is perceived to hold and the Motivation to comply (Mc_j) with the perceived expectation held by the jth reference group. PBC was likewise measured by measuring the two components that combine multiplicatively across k salient control factors to shape the PBC to act green, namely the perceived power (p_j) of the various salient control factors and the perceived control (c_j) over the various salient control factors. Similarly, Green Attitude was measured by measuring the two components that combine multiplicatively across q salient outcomes to shape the attitude towards acting green, namely the belief (b_j) that the jth outcome will result from acting green and the evaluation (e_j) of the attractiveness of the jth outcome.

Logically, it cannot be expected that a specific Normative belief strength will consistently apply across all salient reference groups. Nor can it be logically expected that a specific strength of the Motivation to comply with the perceived expectation will apply consistently across all salient reference groups. The same line of reasoning also applies to the components constituting PBC and Green Attitude. If one cannot logically expect internal consistency in respondents' responses to the items of these six subscales, it made no sense to subject these subscales to item analysis. Item analysis had, however, been conducted separately on all of the other scales or subscales used to measure the unidimensional latent variables or latent dimensions of multidimensional latent variables in the proposed EGB structural model. The item analysis results obtained for each scale or subscale is further discussed in more detail in the subsequent paragraphs.

5.4.1. Employee Green Behaviour

EGB has been conceptualised in terms of five second-order latent dimensions. The items for the five subscales have been developed to tap into the broad themes shared by the first-order factors that load onto each second-order EGB factor according to Ones and Dilchert's (2012a) conceptualisation of EGB (see Table 2.1) rather than items that reflect the narrow themes

unique to the various first-order factors that load onto each second-order factor. The item analysis was conducted separately for each of the five EGB subscales.

5.4.1.1. Taking Initiative

The Taking Initiative subscale of the EGB scale comprised of 3 items measured on a 5-point scale. The item analysis results for the Taking Initiative subscale are shown in Table 5.3.

Table 5.3.

Item statistics for the Taking Initiative subscale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.812	.815	3

Item Statistics

	Mean	Std. Deviation	N
Q3	3.67	.806	221
Q4	2.76	1.173	221
Q5	2.74	1.234	221

Inter-Item Correlation Matrix

	Q3	Q4	Q5
Q3	1.000	.544	.475
Q4	.544	1.000	.766
Q5	.475	.766	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.054	2.738	3.670	.932	1.340	.284	3
Item Variances	1.183	.649	1.522	.872	2.343	.218	3
Inter-Item Correlations	.595	.475	.766	.291	1.613	.018	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q3	5.49	5.115	.541	.304	.867
Q4	6.41	3.115	.784	.629	.606
Q5	6.43	3.055	.733	.591	.674

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
9.16	7.737	2.782	3

Table 5.3. indicates that a satisfactory Cronbach's Alpha of .812 was obtained that exceeded the critical cut-off value of .80. An absence of extreme means on the 5-point response scale indicates that there were no item distributions that were truncated at the upper or lower end of the distribution and thereby restricted the item standard deviation. The highest mean was for item Q3, but this was not sufficiently extreme enough to significantly curtail the variance of the distribution. Item Q3 showed itself to be somewhat of an outlier in the item standard deviation

distribution. (Theron, 2017). Item Q3 showed itself to consistently correlate lower than the mean inter-item correlation (.5950 with the remaining items of the subscale. Q3 showed itself as an outlier in the corrected item-total correlation distribution. The squared multiple correlations ranged from .304 to .629 with the squared multiple correlation of item Q3 showing itself as much lower than the R^2 of the other items. This suggested that the variance in this item might originate from a somewhat different source of systematic variance than the variance in the remaining items.

The fact that the responses to Q3 to a noteworthy degree were determined by a different source of systematic variance negatively affected the degree to which the item responded in unison with the remaining items. Consequently, the results revealed that item Q3 would increase the current Cronbach's Alpha if deleted. The basket of evidence flagged Q3 as a poor item. The length of the subscale taken in conjunction with the severity of the evidence against Q3, however, swayed the decision towards not deleting Q3.

5.4.1.2. Working Sustainably

The Working Sustainably subscale of the EGB scale comprised 4 items measured on a 5-point scale. The item analysis results for the Working Sustainably subscales are shown in Table 5.4.

Table 5.4.

Item statistics for the Working Sustainable subscale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.761	.770	4

Item Statistics

	Mean	Std. Deviation	N
Q6	3.48	.927	221
Q7	3.76	.946	221
Q8	3.09	1.220	221
Q9	4.09	.883	221

Inter-Item Correlation Matrix

	Q6	Q7	Q8	Q9
Q6	1.000	.642	.494	.394
Q7	.642	1.000	.463	.455
Q8	.494	.463	1.000	.289
Q9	.394	.455	.289	1.000

Table 5.4.

Item statistics for the Working Sustainable subscale (continued)

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.602	3.086	4.086	1.000	1.324	.180	4
Item Variances	1.005	.779	1.488	.709	1.910	.106	4
Inter-Item Correlations	.456	.289	.642	.354	2.225	.012	4

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q6	10.93	5.613	.657	.470	.655
Q7	10.65	5.510	.666	.481	.649
Q8	11.32	5.065	.511	.283	.750
Q9	10.32	6.555	.448	.228	.758

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
14.41	9.361	3.060	4

A less than satisfactory Cronbach's Alpha of .761 was obtained, as shown in the Reliability Statistics section of Table 5.4. This indicates that approximately 76% of the variance in the items was systematic or true score variance and 14% was random error variance.

The Item Statistics section of Table 5.4. indicates that none of the items in this subscale had extreme means (high or low). Additionally, none of the items displayed sufficiently small standard deviations that warranted flagging them as outliers in the item standard deviation distribution. Nonetheless, the lowest standard deviation was for item Q9. And the highest mean was also for item Q9, but this was not sufficiently extreme enough to significantly curtail the variance of the distribution. Hence, this suggests that there are no insensitive items present in the subscale. None of the items consistently correlated lower than the mean inter-item correlation (.456) with the remaining items of the subscale. None of the items showed themselves as outliers in the corrected item-total distribution or the squared multiple correlation distribution. All the items tapped into the same source of systematic variance (although not necessarily a unidimensional source nor necessarily the latent EGB dimension of interest).

All the items therefore responded in reasonable unison to differences in standing on the latent EGB dimension. The results consequently revealed that none of the items would increase the current Cronbach's Alpha if deleted. Overall, the findings suggest the absence of poor items and all of the items were retained in the Working Sustainably subscale.

5.4.1.3. Conserving

The Conserving subscale of the EGB scale comprised 4 items measured on a 5-point scale. The item analysis results for the Conserving subscale are shown in Table 5.5.

Table 5.5.

Item statistics for the Conserving subscale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.831	.832	4

Item Statistics

	Mean	Std. Deviation	N
Q10	3.95	.908	221
Q11	3.87	.983	221
Q12	3.58	1.061	221
Q13	3.76	1.066	221

Inter-Item Correlation Matrix

	Q10	Q11	Q12	Q13
Q10	1.000	.589	.537	.402
Q11	.589	1.000	.682	.566
Q12	.537	.682	1.000	.540
Q13	.402	.566	.540	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.794	3.584	3.955	.371	1.104	.026	4
Item Variances	1.013	.825	1.135	.310	1.376	.022	4
Inter-Item Correlations	.553	.402	.682	.279	1.694	.007	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q10	11.22	7.055	.594	.383	.814
Q11	11.30	6.121	.752	.573	.744
Q12	11.59	5.942	.711	.522	.761
Q13	11.41	6.425	.590	.366	.819

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
15.18	10.746	3.278	4

Table 5.5. indicates that a satisfactory Cronbach's Alpha of .831 was obtained. This indicates that approximately 83% of the variance in the items was systematic or true score variance and 17% was random error variance. None of the items in this subscale had extreme means (high or low). Additionally, none of the items displayed sufficiently small standard deviations to position them as outliers in the item standard deviation distribution. Hence, this suggests that there are no insensitive items present in the scale that, relative to their colleagues, failed to

discriminate between respondents that differed relatively little in their standing on the latent EGB dimension. None of the items consistently correlated lower than the mean inter-item correlation (.553) with the remaining items of the subscale. None of the items showed themselves as outliers in the corrected item-total correlation or squared multiple correlation distributions. These findings suggest that all the items were underpinned by the same source of systematic variance.

Because they were underpinned by the same source of systematic variance the items responded in reasonable unison to respondents that differed in their standing on the latent EGB dimension. Consequently, the results revealed that none of the items would increase the current Cronbach's Alpha if deleted. Overall, the findings suggested the absence of poor items and all of the items were consequently retained in the Conserving subscale.

5.4.1.4. Influencing Others

The Influencing Others subscale of the EGB scale comprised only 2 items measured on a 5-point scale. The small number of items curtailed the item analysis results for the Influencing Others subscale are shown in Table 5.6.

Table 5.6.

Item Statistics for the Influencing Others subscale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.816	.819	2

Item Statistics

	Mean	Std. Deviation	N
Q14	3.63	1.078	221
Q15	2.86	1.207	221

Inter-Item Correlation Matrix

	Q14	Q15
Q14	1.000	.693
Q15	.693	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.244	2.860	3.629	.769	1.269	.296	2
Item Variances	1.310	1.162	1.458	.296	1.255	.044	2
Inter-Item Correlations	.693	.693	.693	.000	1.000	.000	2

Table 5.6.

Item Statistics for the Influencing Others subscale

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q14	2.86	1.458	.693	.481	.
Q15	3.63	1.162	.693	.481	.

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
6.49	4.424	2.103	2

Table 5.6. indicates that a satisfactory Cronbach's Alpha of .816 was obtained that exceeded the critical cut-off of .80. This indicates that approximately 81% of the variance in the items was systematic or true score variance and 19% was random error variance. The Item Statistics section of Table 5.6. indicates that none of the items in this subscale had extreme means (high or low). Additionally, none of the items displayed sufficiently small standard deviations to flag them as outliers in the item standard deviation distribution. Hence, it can be concluded that all the items were sufficiently sensitive. The two items correlated positively and moderately high with each other indicating 48% shared variance.

The Item-total Statistics section in Table 5.6. did not offer any meaningful information that assisted in the psychometric evaluation of the items comprising the Influencing Others subscale. In the absence of any evidence to raise concern about any item all of the items were retained in the Influencing Others subscale.

5.4.1.5. Avoiding Harm

The Avoiding Harm subscale of the EGB scale comprised 3 items measured on a 5-point scale. The item analysis results for the Avoiding Harm subscale are shown in Table 5.7.

Table 5.7.

Item statistics for the Avoiding Harm subscale

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.748	.748	3

Item Statistics			
	Mean	Std. Deviation	N
Q16	3.90	.886	221
Q17	3.12	1.151	221
Q18	2.90	1.152	221

Table 5.7.

Item statistics for the Avoiding Harm subscale (continued)

Inter-Item Correlation Matrix			
	Q16	Q17	Q18
Q16	1.000	.418	.467
Q17	.418	1.000	.609
Q18	.467	.609	1.000

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.306	2.900	3.896	.995	1.343	.273	3
Item Variances	1.146	.785	1.326	.542	1.691	.098	3
Inter-Item Correlations	.498	.418	.609	.191	1.457	.008	3

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q16	6.02	4.268	.493	.246	**.757**
Q17	6.80	3.063	.612	.394	.622
Q18	7.02	2.963	.647	.425	.576

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
9.92	6.857	2.619	3

Table 5.7. returned a somewhat less than satisfactory Cronbach's Alpha of .748 for the Avoiding Harm subscale that fell below the critical cut-off value of .80. The smallest standard deviation was for item Q16 but the item could not be tagged as an outlier in the item standard deviation distribution. The highest mean was also for item Q16, but the item mean was not sufficiently extreme to significantly curtail the variance of the item distribution. Item Q16 consistently correlated lower than the mean inter-item correlation with the remaining items of the subscale but not excessively so. Item Q16 also showed itself somewhat of an outlier in the corrected item-total distribution and in the squared multiple correlation distribution. Furthermore, the results revealed that item Q16 would modestly increase the current Cronbach's Alpha if deleted (from .748 to .757). Nonetheless, this is a rather small increase and suggests that item Q16 does not seriously disturb the internal consistency of this subscale and will not be flagged as a seriously problematic item. Given the small number of items in the subscale combined with the marginal nature of the evidence against item Q16 it was decided to retain all the items in the Avoiding Harm subscale.

5.4.1.6. Reliability of the Unweighted Employee Green Behaviour Composite Score

Cronbach's Alpha coefficients were calculated for each of the five EGB subscales. Calculating the reliability of the unweighted EGB composite/total score in the same manner as the

subscale reliabilities would have underestimated the reliability of the scale as a function of the extent to which the subscales correlate lower with each other. To estimate the reliability of the total score, calculated as the unweighted sum of the four *Psychological Empowerment* subscale scores, the following formula proposed by Nunnally (1978, p. 248) was used:

$$rtot = 1 - \left[\frac{[\sum_{i=1}^{5} S^2 i - \sum_{i=1}^{5} rtti S^2 i]}{S^2 t}\right]$$

Where:

- r_{tot} refers to the reliability of the unweighted linear composite
- S^2_i refers to the variance of the ith subscale score
- r_{tti} refers to the internal consistency reliability of the ith subscale
- S^2_t refers to the variance of the unweighted total score.

The unweighted total score reliability for the complete *Psychological Empowerment* scale was calculated as:

$$rtot = 1 - \left[\frac{[\sum_{i=1}^{4} S^2 i - \sum_{i=1}^{4} rtti S^2 i]}{S^2 t}\right]$$

$$= 1 - [\frac{39.125 - 31.07511}{117.158}]$$

$$= 1 - [\frac{8.049889}{117.158}]$$

$$= 1 - .068709$$

$$= .93129$$

The resultant value of .93 was considered highly satisfactory[29].

5.4.2. Intention to Act Green

The Intention to Act Green (IAG) scale comprised of 5 items measured on a 5-point scale. The item analysis results for the IAG scale are shown in Table 5.8.

Table 5.8.

Item Statistics for the Intention to Act Green scale

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.830	.831	5

[29] The value of .93 contrasted with the value of .906 that would have been obtained if all the EGB items would have simply been combined in a single item analysis.

Table 5.8.

Item statistics for the Intention to Act Green Scale (continued)

Item Statistics			
	Mean	Std. Deviation	N
Q19	3.10	1.206	221
Q20	3.71	1.043	221
Q21	4.05	.893	221
Q22	3.47	1.114	221
Q23	3.91	.996	221

Inter-Item Correlation Matrix					
	Q19	Q20	Q21	Q22	Q23
Q19	1.000	.601	.375	.615	.439
Q20	.601	1.000	.534	.556	.456
Q21	.375	.534	1.000	.472	.486
Q22	.615	.556	.472	1.000	.432
Q23	.439	.456	.486	.432	1.000

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.649	3.100	4.054	.955	1.308	.142	5
Item Variances	1.114	.797	1.454	.657	1.824	.062	5
Inter-Item Correlations	.497	.375	.615	.240	1.639	.006	5

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q19	15.14	10.115	.655	.490	.790
Q20	14.53	10.759	.694	.496	.778
Q21	14.19	12.191	.578	.386	.811
Q22	14.77	10.512	.670	.469	.784
Q23	14.33	11.778	.559	.330	.815

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
18.24	16.595	4.074	5

As shown in the Reliability Statistics section of Table 5.8., there is a satisfactory Cronbach's Alpha of .830 that was obtained. The Item Statistics section of Table 5.8. indicates the absence of extreme high or extreme low means. Additionally, none of the items displayed sufficiently small standard deviations that warranted flagging them as outliers in the item standard deviation distribution. Nonetheless, the lowest standard deviation was for item Q21. And the highest mean was also for item Q21, but this was not sufficiently extreme enough to significantly curtail the variance of the distribution. Hence, this suggests that there are no insensitive items present in the subscale.

None of the items consistently correlated lower than the mean inter-item correlation (.497) with the remaining items of the scale. None of the items showed themselves as outliers in the corrected item-total correlation or squared multiple correlation distributions. Furthermore, the

results revealed that none of the items would increase the current Cronbach's Alpha if deleted. The evidence suggests the absence of poor items and all items were retained in the IAG scale.

5.4.3. Moral Norm

The Moral Norm scale comprised of 4 items measured on a 7-point scale. The item analysis results for the Moral Norm scale are shown in Table 5.9.

Table 5.9.

Item statistics for the Moral Norm scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.862	.870	4

Item Statistics

	Mean	Std. Deviation	N
Q46	5.48	1.460	221
Q47	5.62	1.304	221
Q48	6.10	1.132	221
Q49	4.99	1.638	221

Inter-Item Correlation Matrix

	Q46	Q47	Q48	Q49
Q46	1.000	.658	.677	.625
Q47	.658	1.000	.623	.654
Q48	.677	.623	1.000	.516
Q49	.625	.654	.516	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	5.549	4.991	6.100	1.109	1.222	.208	4
Item Variances	1.949	1.281	2.682	1.401	2.094	.360	4
Inter-Item Correlations	.626	.516	.677	.162	1.314	.003	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q46	16.71	12.207	.758	.589	.804
Q47	16.57	13.236	.752	.567	.809
Q48	16.10	14.805	.688	.515	.840
Q49	17.20	11.699	.687	.495	.844

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
22.19	22.076	4.698	4

Table 5.9. suggests that a satisfactory Cronbach's Alpha of .862 was obtained that exceeded the critical cut-off of .80. This indicates that approximately 86% of the variance in the items was systematic or true score variance and 14% was random error variance. None of the items

in this subscale had extreme high or extreme low means. Additionally, none of the items displayed sufficiently small standard deviations to flag them as outliers in the item standard deviation distribution. Hence, it can be concluded that all the items were sufficiently sensitive. None of the items consistently correlated lower than the mean inter-item correlation (.626) with the remaining items of the scale. None of the items showed themselves as outliers in the corrected item-total correlation or squared multiple correlation distributions. Furthermore, the results revealed that none of the items would increase the current Cronbach's Alpha if deleted. In the absence of any evidence to raise concern about any item, all of the items were retained in the Moral Norm scale.

5.4.4. Rewards and Recognition

The Rewards and Recognition scale comprised of 5 items measured on a 7-point scale. The item analysis results for the Rewards and Recognition scale are shown in Table 5.10.

Table 5.10.

Item statistics for the Rewards and Recognition scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.944	.944	5

Item Statistics

	Mean	Std. Deviation	N
Q58	3.92	1.905	221
Q59	3.76	1.759	221
Q60	2.99	1.838	221
Q61	3.01	1.828	221
Q62	3.23	1.756	221

Inter-Item Correlation Matrix

	Q58	Q59	Q60	Q61	Q62
Q58	1.000	.801	.720	.740	.663
Q59	.801	1.000	.715	.728	.798
Q60	.720	.715	1.000	.916	.802
Q61	.740	.728	.916	1.000	.844
Q62	.663	.798	.802	.844	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	3.380	2.986	3.919	.932	1.312	.186	5
Item Variances	3.305	3.085	3.630	.545	1.177	.051	5
Inter-Item Correlations	.773	.663	.916	.253	1.382	.005	5

Table 5.10.

Item statistics for the Rewards and Recognition scale (continued)

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q58	12.98	43.881	.793	.716	.941
Q59	13.14	44.824	.832	.774	.934
Q60	13.91	43.143	.870	.846	.927
Q61	13.89	42.764	.896	.882	.922
Q62	13.67	44.466	.852	.799	.930

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
16.90	67.517	8.217	5

Table 5.10. suggests that a highly satisfactory Cronbach's Alpha of .944 was obtained, which exceeded the critical cut-off of .80. The Item Statistics section of Table 5.10. indicates that none of the items in this scale had extreme means (high or low). Additionally, none of the items displayed sufficiently small standard deviations to flag them as outliers in the item standard deviation distribution. Hence, it can be concluded that all the items were sufficiently sensitive. None of the items consistently correlated lower than the mean inter-item correlation (.773) with the remaining items of the scale. Furthermore, the results revealed that none of the items would increase the current Cronbach's Alpha if deleted. It can therefore be concluded that there are no poor items evident and all items will be retained for the Rewards and Recognition scale.

5.4.5. Problem Awareness

The Problem Awareness scale comprised of 11 items measured on a 5-point scale. The item analysis results for the Problem Awareness scale are shown in Table 5.11.

Table 5.11.

Item statistics for the Problem Awareness scale

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.814	.831	11

Item Statistics			
	Mean	Std. Deviation	N
Q63	4.68	.571	221
Q64	4.62	.571	221
Q65	4.22	.873	221
Q66	4.40	.817	221
Q67	4.71	.616	221
Q68	4.64	.657	221
Q69	4.28	.916	221

Table 5.11.

***Item statistics for the Problem Awareness scale* (continued)**

Item Statistics			
	Mean	Std. Deviation	N
Q70R	3.99	1.202	221
Q71R	4.42	.768	221
Q72R	4.19	.945	221
Q73R	4.53	.834	221

Inter-Item Correlation Matrix											
	Q63	Q64	Q65	Q66	Q67	Q68	Q69	Q70R	Q71R	Q72R	Q73R
Q63	1.000	.553	.485	.417	.513	.323	.440	.155	.281	.207	.261
Q64	.553	1.000	.410	.429	.374	.217	.393	.253	.161	.203	.184
Q65	.485	.410	1.000	.630	.363	.360	.384	.158	.258	.152	.202
Q66	.417	.429	.630	1.000	.492	.354	.360	.203	.227	.282	.234
Q67	.513	.374	.363	.492	1.000	.335	.386	.181	.343	.167	.170
Q68	.323	.217	.360	.354	.335	1.000	.479	.197	.192	.216	.213
Q69	.440	.393	.384	.360	.386	.479	1.000	.254	.240	.246	.208
Q70R	.155	.253	.158	.203	.181	.197	.254	1.000	.373	.441	.268
Q71R	.281	.161	.258	.227	.343	.192	.240	.373	1.000	.464	.411
Q72R	.207	.203	.152	.282	.167	.216	.246	.441	.464	1.000	.306
Q73R	.261	.184	.202	.234	.170	.213	.208	.268	.411	.306	1.000

Summary Item Statistics							
	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.426	3.991	4.710	.719	1.180	.055	11
Item Variances	.669	.326	1.445	1.119	4.427	.107	11
Inter-Item Correlations	.309	.152	.630	.478	4.135	.014	11

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q63	44.00	24.759	.568	.489	.796
Q64	44.06	25.096	.505	.397	.800
Q65	44.47	23.123	.528	.493	.794
Q66	44.29	23.107	.578	.524	.789
Q67	43.98	24.759	.518	.422	.798
Q68	44.05	24.829	.466	.302	.801
Q69	44.41	22.797	.535	.373	.793
Q70R	44.70	22.212	.411	.274	**.815**
Q71R	44.27	23.962	.501	.392	.797
Q72R	44.49	23.242	.459	.350	.802
Q73R	44.15	24.313	.402	.228	.807

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
48.69	28.316	5.321	11

Table 5.11. suggests that a satisfactory Cronbach's Alpha of .814 was obtained, which exceeded the critical cut-off of .80. The output further indicates the absence of extreme high or extreme low means. Additionally, none of the items displayed sufficiently small standard

deviations to flag them as outliers in the item standard deviation distribution. Hence, it can be concluded that all the items were sufficiently sensitive.

None of the items consistently correlated lower than the mean inter-item correlation (.309) with the remaining items of the scale. Item Q73R, and to a lesser degree Q70R showed themselves as slight outliers in the corrected item-total and squared multiple correlation distributions. Furthermore, the results revealed that item Q70R would increase the current Cronbach's Alpha if deleted (but not so for Q73R). But this increase is extremely small (from .814 to .815) and does not raise major concerns. Item Q70R therefore does not present sufficiently problematic to be flagged as a seriously problematic item. Hence, the findings suggest the absence of poor items and all items will be retained for the Problem Awareness scale.

5.4.6. Internal Attribution

The Internal Attribution scale comprised of 6 items measured on a 5-point scale. The item analysis results for the Internal Attribution scale are shown in Table 5.12.

Table 5.12.

Item statistics for the Internal Attribution scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.891	.902	6

Item Statistics

	Mean	Std. Deviation	N
Q74	4.70	.542	221
Q75	4.67	.582	221
Q76	4.38	.775	221
Q77	4.63	.577	221
Q78	4.60	.629	221
Q79	4.36	.806	221

Inter-Item Correlation Matrix

	Q74	Q75	Q76	Q77	Q78	Q79
Q74	1.000	.723	.527	.732	.666	.543
Q75	.723	1.000	.561	.712	.583	.591
Q76	.527	.561	1.000	.580	.552	.518
Q77	.732	.712	.580	1.000	.718	.570
Q78	.666	.583	.552	.718	1.000	.512
Q79	.543	.591	.518	.570	.512	1.000

Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.558	4.362	4.697	.335	1.077	.022	6
Item Variances	.436	.294	.650	.356	2.211	.023	6
Inter-Item Correlations	.606	.512	.732	.220	1.429	.006	6

Table 5.12.

***Item statistics for the Internal Attribution scale* (continued)**

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q74	22.65	7.564	.767	.646	.867
Q75	22.67	7.384	.766	.629	.865
Q76	22.96	6.890	.652	.430	.885
Q77	22.71	7.305	.804	.685	.860
Q78	22.75	7.288	.725	.578	.870
Q79	22.99	6.768	.650	.431	.887

Scale Statistics			
Mean	Variance	Std. Deviation	N of Items
27.35	10.146	3.185	6

Table 5.12. suggests a very satisfactory Cronbach's Alpha of .891 was obtained, which exceeded the critical cut-off of .80. The Item Statistics section of Table 5.12. indicates that none of the items in this scale had extreme means (high or low). Additionally, none of the items displayed sufficiently small standard deviations to flag them as outliers in the item standard deviation distribution. Hence, it can be concluded that all the items were sufficiently sensitive. None of the items consistently correlated lower than the mean inter-item correlation (.606) with the remaining items of the scale. None of the items showed themselves as outliers in the corrected item-total distribution or the squared multiple correlation distribution. All the items therefore were underpinned by a common source of systematic variance although not necessarily a unidimensional source nor necessarily the intended source. Furthermore, because of this, the results revealed that none of the items would increase the current Cronbach's Alpha if deleted. The findings suggest that there are no poor items that should be removed for the Internal Attribution scale.

5.4.7. Summary of the Item Analysis Results

In summary, all of the subscales and scales displayed very satisfactory reliability coefficients (≥.80) with the exception of the Working Sustainably subscale (.761) and the Avoiding Harm subscale (.748) of the EGB scale. All the Cronbach's Alpha's exceeded the critical cut-off value of >.70, which supports the internal consistency of the items of all subscales. Most the subscales that were item analysed did not show evidence of any poor items. Although some items appeared problematic and showed possible reason for concern, it is argued that the evidence was not strong enough to remove these items. Hence, the item analysis confirmed that no poor items were detected for this study and all items were retained for the various scales and subscales.

5.5. DIMENSIONALITY ANALYSIS

Dimensionality analysis was performed through EFA on each of the subscales. As discussed in Chapter 3, the purpose of EFA was to confirm the assumption of unidimensionality, to remove items with weak factor loadings and to confirm the assumption that the target latent variable explains a significant proportion of variance observed in each item.

The two subscales associated with the latent variables GSN, PBC, and Green Attitude were not subjected to EFA. The same line of reasoning used to motivate why these scales were not item analysed, also applies here. Hence, it made no sense to subject these subscales to dimensionality analysis/ EFA. Dimensionality analysis had, however, been conducted on all of the other scales or subscales in the proposed EGB structural model.

The inter-item correlation matrices were assessed as they indicate to what degree items correlate with each other and share one or more common sources of variance. For the scales to be considered factor analysable, the correlation matrix should show numerous statistically significant ($p<.05$) and reasonably high correlations ($r_{ij} \geq .30$). Bartlett's Test of Sphericity should also be statistically significant ($p<.05$), and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy values should at least exceed .6 (Theron, 2017). Principal axis factor analysis with oblique rotation was used on the various subscales and scales to determine unidimensionality. The eigenvalue-greater-than-one rule combined with the scree plot was used to determine the number of factors to be extracted. SPSS (SPSS version 25) was used to perform the dimensionality analyses performed for each subscale separately. A summary of dimensionality analysis results obtained for each scale or subscale follows.

5.5.1. Taking Initiative

The correlation matrix, for the Taking Initiative subscale, shown in Table 5.13, showed that all correlations were larger than .30 and that all the correlations were statistically significant ($p<.05$). Furthermore, a KMO of.645 (>.6) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (2.199 > 1). The position of the elbow in the scree plot shown in Figure 5.1, confirmed that a single factor should be extracted. The factor matrix revealed that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure

provided a highly satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Taking Initiative subscale, was thus corroborated.

Table 5.13.

Factor analysis for the Taking Initiative subscale

Correlation Matrix[a]

		Q3	Q4	Q5
Correlation	Q3	1.000	.544	.475
	Q4	.544	1.000	.766
	Q5	.475	.766	1.000
Sig. (1-tailed)	Q3		.000	.000
	Q4	.000		.000
	Q5	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.654
Bartlett's Test of Sphericity	Approx. Chi-Square	271.759
	df	3
	Sig.	.000

Communalities

	Initial	Extraction
Q3	.304	.338
Q4	.629	.873
Q5	.591	.671

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.199	73.303	73.303	1.882	62.732	62.732
2	.572	19.075	92.378			
3	.229	7.622	100.000			

Factor Matrix[a]

	Factor 1
Q3	.934
Q4	.819
Q5	.581

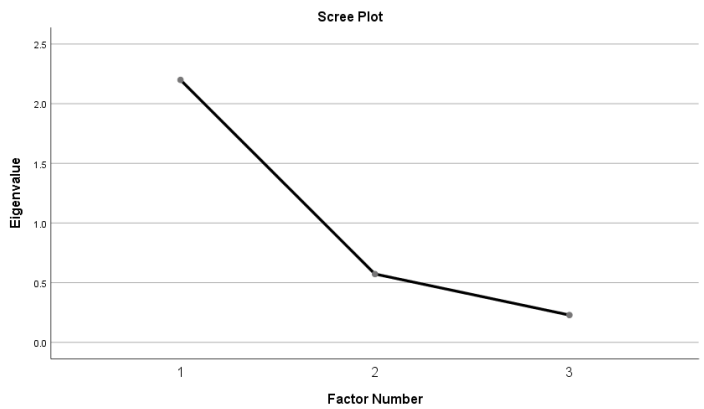


Figure 5.1. **Scree plot for the Taking Initiative subscale of the EGB scale**

5.5.2. Working Sustainably

The correlation matrix, for the Working Sustainably subscale, shown in Table 5.14, showed that most of the correlations were larger than .30. The correlation between Q8 and Q9 however was rather small (.289) and could be seen as worrisome (<.30). Nonetheless, all correlations were statistically significant (p<.05). Furthermore, a KMO of .751 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic (p<.05) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (2.387 > 1). The scree plot shown in Figure 5.2, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a highly satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Working Sustainably subscale, was thus corroborated.

Table 5.14.

Factor analysis for the Working Sustainably subscale

Correlation Matrix[a]

		Q6	Q7	Q8	Q9
Correlation	Q6	1.000	.642	.494	.394
	Q7	.642	1.000	.463	.455
	Q8	.494	.463	1.000	.289
	Q9	.394	.455	**.289**	1.000
Sig. (1-tailed)	Q6		.000	.000	.000
	Q7	.000		.000	.000
	Q8	.000	.000		.000
	Q9	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.751
Bartlett's Test of Sphericity	Approx. Chi-Square	243.708
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
Q6	.470	.632
Q7	.481	.668
Q8	.283	.345
Q9	.228	.270

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.387	59.671	59.671	1.914	47.853	47.853
2	.723	18.085	77.757			
3	.538	13.455	91.212			
4	.352	8.788	100.000			

Table 5.14.

Factor analysis for the Working Sustainably subscale **(continued)**

Factor Matrix[a]	
	Factor 1
Q6	.817
Q7	.795
Q8	.587
Q9	.520

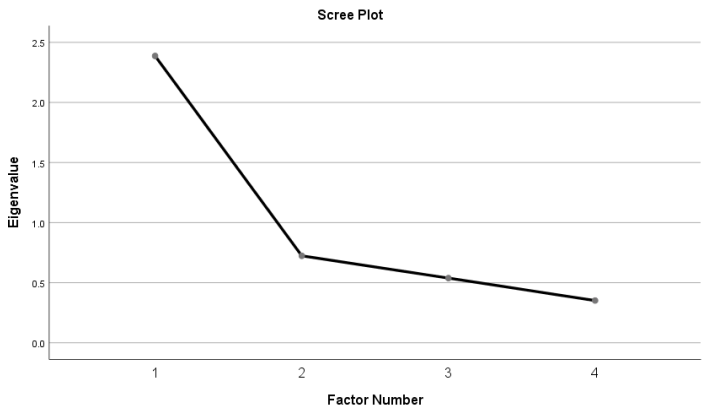


Figure 5.2**. Scree plot for the Working Sustainably subscale of the EGB scale**

5.5.3. Conserving

The correlation matrix, for the Conserving subscale in Table 5.15., showed that all correlations were larger than .30 and that all the correlations were statistically significant ($p<.05$). Furthermore, a KMO of .796 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (2.667 > 1). The scree plot, shown in Figure 5.3, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a highly satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Conserving subscale, was thus corroborated.

Table 5.15.

Factor analysis for the Conserving subscale

Correlation Matrix[a]					
		Q10	Q11	Q12	Q13
Correlation	Q10	1.000	.589	.537	.402
	Q11	.589	1.000	.682	.566
	Q12	.537	.682	1.000	.540
	Q13	.402	.566	.540	1.000
Sig. (1-tailed)	Q10		.000	.000	.000
	Q11	.000		.000	.000
	Q12	.000	.000		.000
	Q13	.000	.000	.000	

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.796
Bartlett's Test of Sphericity	Approx. Chi-Square	340.070
	df	6
	Sig.	.000

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.667	66.677	66.677	2.257	56.436	56.436
2	.599	14.963	81.640			
3	.425	10.625	92.266			
4	.309	7.734	100.000			

Factor Matrix[a]	
	Factor 1
Q10	.866
Q11	.806
Q12	.662
Q13	.649

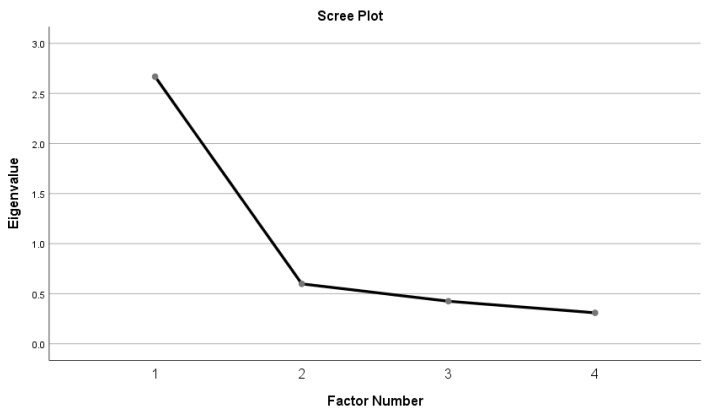


Figure 5.3. **Scree plot for the Conserving subscale of the EGB scale**

5.5.4. Influencing Others

The correlation matrix, for the Taking Initiative subscale, shown in Table 5.16, showed that the correlation between the two items was larger than .30 and that all the correlations were statistically significant ($p<.05$). Unfortunately, a KMO of .500 (<.6) was obtained, which suggested a methodological limitation.[30] Nonetheless, the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented reasonably strong evidence that the correlation matrix was factor analysable. One factor was extracted since only one factor obtained an eigenvalue greater than one (1.693 > 1). The scree plot, shown in Figure 5.4, could not assist in identifying the appropriate number of factors to extract since the subscale only comprised of two items and hence the maximum number of possible factors was two. This precluded the possibility of identifying an elbow in the scree plot. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$).

Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a highly satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Influencing Others subscale, was thus corroborated.

Table 5.16.

Factor analysis for the Influencing Others subscale

Correlation Matrix[a]			
		Q14	Q15
Correlation	Q14	1.000	.693
	Q15	.693	1.000
Sig. (1-tailed)	Q14		.000
	Q15	.000	
a. Determinant = .519			

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	143.217
	df	1
	Sig.	.000

Communalities		
	Initial	Extraction
Q14	.481	.693
Q15	.481	.693

[30] The fact that the subscale on comprised two items itself posed a methodological limitation which made the use of exploratory factor analysis on this subscale contentious.

Table 5.16.

***Factor analysis for the Influencing Others subscale* (continued)**

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.693	84.670	84.670	1.385	69.256	69.256
2	.307	15.330	100.000			

Factor Matrix[a]	
	Factor 1
Q14	.832
Q15	.832

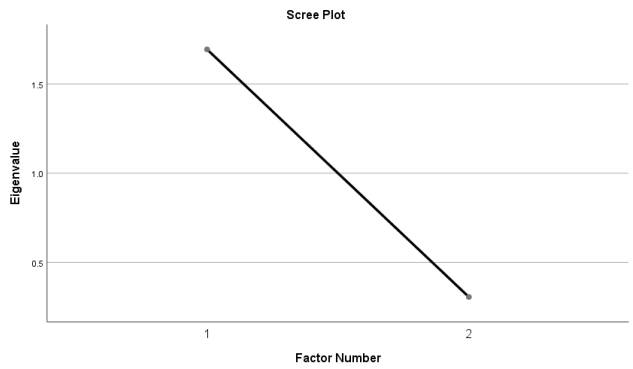


***Figure 5.4*. Scree plot for the Influencing Others subscale of the EGB scale**

5.5.5. Avoiding Harm

The correlation matrix, for the Avoiding Harm subscale, shown in Table 5.17, showed that all correlations were larger than .30 and that all the correlations were statistically significant ($p<.05$). Furthermore, a KMO of .663 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (2.000 > 1). The position of the elbow in the scree plot, shown in Figure 5.5, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a highly satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Avoiding Harm subscale, was thus corroborated.

Table 5.17.

Factor analysis for the Avoiding Harm subscale

Correlation Matrix[a]				
		Q16	Q17	Q18
Correlation	Q16	1.000	.418	.467
	Q17	.418	1.000	.609
	Q18	.467	.609	1.000
Sig. (1-tailed)	Q16		.000	.000
	Q17	.000		.000
	Q18	.000	.000	
a. Determinant = .474				

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.663
Bartlett's Test of Sphericity	Approx. Chi-Square	162.776
	df	3
	Sig.	.000

Communalities		
	Initial	Extraction
Q16	.246	.321
Q17	.394	.548
Q18	.425	.676

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.000	66.681	66.681	1.545	51.498	51.498
2	.613	20.420	87.101			
3	.387	12.899	100.000			

Factor Matrix[a]	
	Factor 1
Q16	.822
Q17	.740
Q18	.566

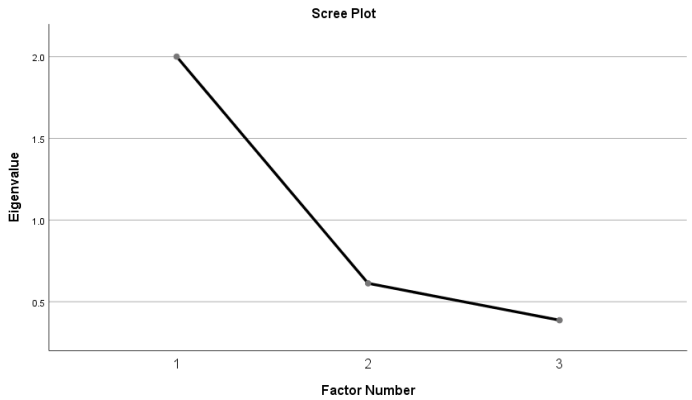


Figure 5.5. **Scree plot for the Avoiding Harm subscale of the EGB scale**

5.5.6. Intention to Act Green

The correlation matrix, for the IAG scale, depicted in Table 5.18, showed that all correlations were larger than .30 and that all the correlations were statistically significant ($p<.05$). Furthermore, a KMO of .813 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

Only one factor was extracted, since only one factor obtained an eigenvalue greater than one (2.993 > 1). The scree plot, shown in Figure 5.6 confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, only 3 (30%) of the nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a reasonably satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the IAG scale, was thus corroborated.

Table 5.18.

Factor analysis for the Intention to Act Green scale

Correlation Matrix[a]

		Q19	Q20	Q21	Q22	Q23
Correlation	Q19	Q20	.601	.375	.615	.439
	Q20	Q21	1.000	.534	.556	.456
	Q21	Q22	.534	1.000	.472	.486
	Q22	Q23	.556	.472	1.000	.432
	Q23	.439	.456	.486	.432	1.000
Sig. (1-tailed)	Q19		.000	.000	.000	.000
	Q20	.000		.000	.000	.000
	Q21	.000	.000		.000	.000
	Q22	.000	.000	.000		.000
	Q23	.000	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.813
Bartlett's Test of Sphericity	Approx. Chi-Square	395.079
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
Q19	.490	.537
Q20	.496	.612
Q21	.386	.415
Q22	.469	.560
Q23	.330	.383

Table 5.18.

***Factor analysis for the Intention to Act Green scale* (continued)**

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.993	59.864	59.864	2.507	50.136	50.136
2	.699	13.981	73.845			
3	.544	10.882	84.727			
4	.436	8.725	93.452			
5	.327	6.548	100.000			

Factor Matrix[a]	
	Factor 1
Q19	.782
Q20	.748
Q21	.733
Q22	.644
Q23	.619

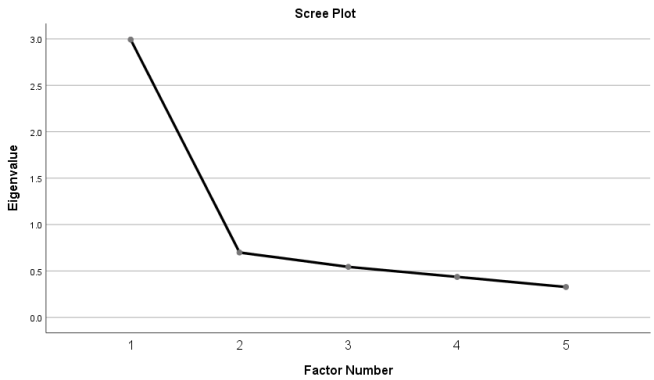


***Figure 5.*6. Scree plot for the Intention to Act Green scale**

5.5.7. Moral Norm

The correlation matrix, for the Moral Norm scale, depicted in Table 5.19, showed that all correlations were larger than .30 and that all the correlations were statistically significant ($p<.05$). Furthermore, a KMO of 0.809 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (2.879 > 1). The scree plot, shown in Figure 5.7, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$). Lastly, zero nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provides a highly satisfactory

and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Moral Norm scale, was thus corroborated.

Table 5.19.

Factor analysis for the Moral Norm scale

Correlation Matrix[a]

		Q46	Q47	Q48	Q49
Correlation	Q46	1.000	.658	.677	.625
	Q47	.658	1.000	.623	.654
	Q48	.677	.623	1.000	.516
	Q49	.625	.654	.516	1.000
Sig. (1-tailed)	Q46		.000	.000	.000
	Q47	.000		.000	.000
	Q48	.000	.000		.000
	Q49	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.809
Bartlett's Test of Sphericity	Approx. Chi-Square	429.934
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
Q46	.589	.709
Q47	.567	.680
Q48	.515	.572
Q49	.495	.551

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.879	71.970	71.970	2.512	62.805	62.805
2	.496	12.394	84.364			
3	.334	8.345	92.708			
4	.292	7.292	100.000			

Factor Matrix[a]

	Factor 1
Q46	.842
Q47	.824
Q48	.756
Q49	.742

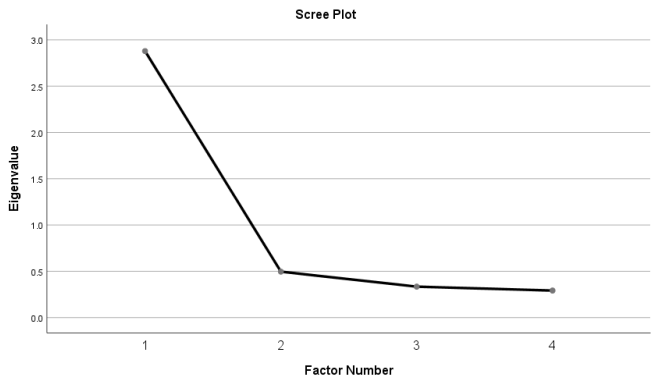


***Figure 5.7*. Scree plot for the Moral Norm scale**

5.5.8. Rewards and Recognition

The correlation matrix, for the Rewards and Recognition scale, depicted in Table 5.20, showed that all correlations were reasonably high and larger than .30, and all of the correlations were statistically significant ($p<.05$). Furthermore, a KMO of .805 (>.6) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable. One factor was extracted since only one factor obtained an eigenvalue greater than one (4.094 > 1). The position of the elbow in the scree plot, shown in Figure 5.8, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 ($\lambda_{i1} \geq .50$).

Table 5.20.

Factor Analysis for the Rewards and Recognition Scale

Correlation Matrix[a]						
		Q58	Q59	Q60	Q61	Q62
Correlation	Q58	1.000	.801	.720	.740	.663
	Q59	.801	1.000	.715	.728	.798
	Q60	.720	.715	1.000	.916	.802
	Q61	.740	.728	.916	1.000	.844
	Q62	.663	.798	.802	.844	1.000
Sig. (1-tailed)	Q58		.000	.000	.000	.000
	Q59	.000		.000	.000	.000
	Q60	.000	.000		.000	.000
	Q61	.000	.000	.000		.000
	Q62	.000	.000	.000	.000	
a. Determinant = .004						

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.805
Bartlett's Test of Sphericity	Approx. Chi-Square	1176.365
	df	10
	Sig.	.000

Table 5.20.

***Factor Analysis for the Rewards and Recognition Scale* (continued)**

Communalities		
	Initial	Extraction
Q58	.716	.665
Q59	.774	.731
Q60	.846	.820
Q61	.882	.872
Q62	.799	.786

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.094	81.877	81.877	3.874	77.481	77.481
2	.423	8.451	90.328			
3	.288	5.752	96.079			
4	.123	2.452	98.532			
5	.073	1.468	100.000			
Extraction Method: Principal Axis Factoring.						

Factor Matrix[a]	
	Factor 1
Q58	.934
Q59	.905
Q60	.886
Q61	.855
Q62	.816

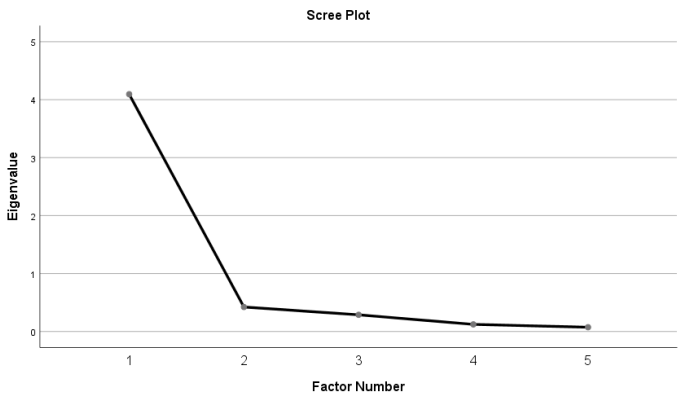


***Figure 5.*8. Scree plot for the Rewards and Recognition scale**

The high percentage of nonredundant residuals (50%) indicated that the single-factor factor solutioned failed to provide a satisfactory and credible explanation for the observed inter-item correlation matrix and this suggested that one should explore if more factors should be extracted. This high percentage of large residuals indicates that more than one factor is required to provide a valid explanation of the observed correlation matrix. Consequently, the extraction of a second factor was forced by requesting the extraction of two factors. SPSS issued a warning stating “Attempted to extract 2 factors. In iteration 250, the communality of a variable exceeded 1.0. Extraction was terminated.” The analysis was subsequently reran but as a principle component analysis rather than a principal axis factor analysis. This resolved

the problem. The resultant pattern matrix that was obtained from this analysis are shown in Table 5.21.

Table 5.21.

Pattern Matrix for the Rewards and Recognition Scale (forcing 2 factors)

	Component	
	1	2
Q60	.998	-.050
Q61	.984	-.018
Q62	.816	.131
Q58	-.037	.977
Q59	.068	.893

Items Q60, Q61 and Q62 loaded on factor 1. Items Q58 and Q59 loaded on factor 2[31]. Given the common theme shared by the items loading on factor 1 and factor 2, factor was interpreted as an EGB reward factor whilst factor 2 was interpreted as an EGB acknowledgement factor. The factor fission made conceptual sense even though it was not formally recognised in the initial conceptualisation of the latent variable. The two extracted factors correlated reasonable high positive (.792) in the factor correlation matrix. The two-factor solution still only provided a somewhat tenuous explanation for the observed inter-item correlation matrix with 30% of the residual correlations greater than .05.

A first-order CFA measurement model was subsequently fitted reflecting the factor loadings prescribed by the pattern matrix. The first-order CFA measurement model showed poor fit (RMSEA=.199; $p<.05$) which was not altogether surprising given that 30% of the residual correlations were large in the residual correlation matrix. Inspection of the modification indices calculated for the fitted first-order model revealed a large number of statistically significant ($p<.01$) modification values for the measurement error covariances (see Figure 5.9).

The measurement error terms (δ_i) represent random error and systematic error influences that produce variance in the items but that were not formally modelled as latent variables in the model. The large number of statistically significant ($p<.01$) modification indices calculated for the covariance terms in $\boldsymbol{\Theta_\delta}$ implied that to some degree all the items are influenced by a common source of systematic variance, currently not acknowledged by the model. This suggests that a bi-factor model might provide a convincing explanation of the observed interitem covariance matrix (Reise, 2012).

[31] The factor loadings in the pattern matric are partial regression coefficients when regressing each item on the two extracted factors. The factor loadings in the pattern matrix therefore reflect the effect of each factor on the item when controlling for the effect of the other factor in both the item and the other factor. This is important since the factors are to some degree correlated due to the oblique rotation.

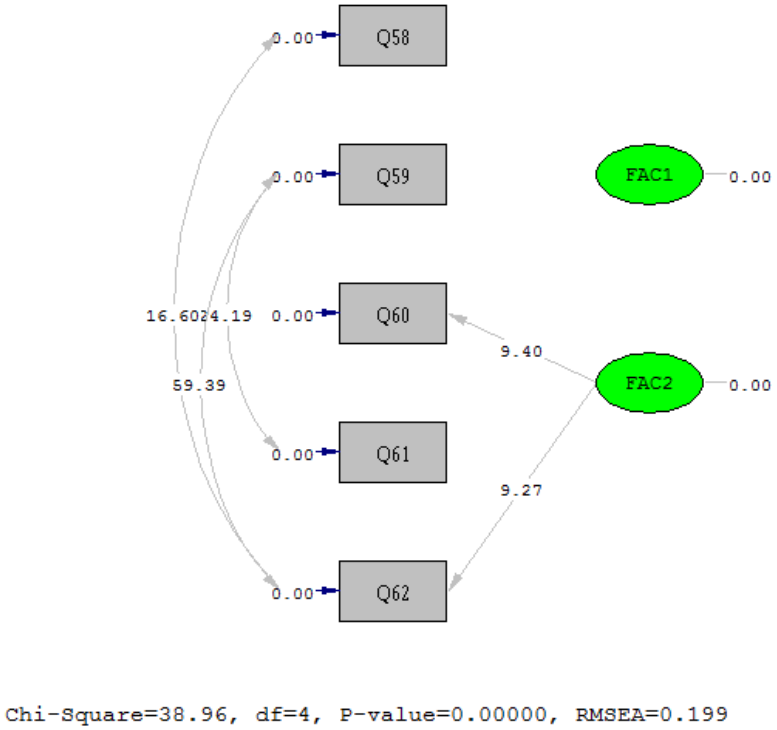


Figure 5.9. **Statistically significant modification indices calculated for the first-order Rewards and Recognition measurement model.**

The bi-factor model making provision for a broad, general Rewards and Recognition factor in addition to two narrower, more specific Rewards and Recognition unfortunately was under-identified with negative degrees of freedom due to the limited number of items. Increasing the number of observed variables was not an option to salvage the problem. To get the model over-identified the factor loadings were fixed to the values obtained in the pattern matrix, the correlation between the two factors were fixed to .792 and the variances of the latent variables were fixed to unity. This solved the identification problem but resulted in a poor fitting bi-factor model (RMSEA=.191; p<.05). In a spirit of optimism, the researchers believe that with a larger number of items the bi-factor model would be over-identified and would show close fit. It is, however, acknowledged that the lack of fit obtained in the current study for the bi-factor model with its constrained parameters erodes confidence in the validity Reward and Recognition scale. This is acknowledged as a methodological weakness.

5.5.9. Problem Awareness

The correlation matrix for the Problem Awareness scale, showed that numerous correlations that were larger than .30 but, as shown in Table 5.22 quite a few correlations were rather low. This was interpreted to be indicative of factor fission rather than a lack of factor analysability. Nevertheless, all of the correlations were statistically significant (p<.05).

A KMO of .806 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic (p<.05) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

The Total Variance Explained section in Table 5.22 suggests that two factors obtained an eigenvalue greater than one (4.152>1; 4.503>1). The scree plot, shown in Figure 5.10, confirmed, that two factors should be extracted although it could be argued that the position of the elbow is somewhat ambiguous. Lastly, the residual correlation matrix (not included in Table 5.22) shows that 13 (23%) of the nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a satisfactory and credible explanation for the observed correlation matrix.

Table 5.22.

Factor analysis for the Problem Awareness scale

Correlation Matrix[a]

		Q63	Q64	Q65	Q66	Q67	Q68	Q69	Q70R	Q71R	Q72R	Q73R
Correlation	Q63	1.000	.553	.485	.417	.513	.323	.440	.155	.281	.207	.261
	Q64	.553	1.000	.410	.429	.374	.217	.393	.253	.161	.203	.184
	Q65	.485	.410	1.000	.630	.363	.360	.384	.158	.258	.152	.202
	Q66	.417	.429	.630	1.000	.492	.354	.360	.203	.227	.282	.234
	Q67	.513	.374	.363	.492	1.000	.335	.386	.181	.343	.167	.170
	Q68	.323	**.217**	.360	.354	.335	1.000	.479	.197	.192	.216	.213
	Q69	.440	.393	.384	.360	.386	.479	1.000	.254	.240	.246	.208
	Q70R	**.155**	**.253**	**.158**	**.203**	**.181**	**.197**	**.254**	1.000	.373	.441	.268
	Q71R	**.281**	**.161**	**.258**	**.227**	.343	**.192**	**.240**	.373	1.000	.464	.411
	Q72R	**.207**	**.203**	**.152**	**.282**	**.167**	**.216**	**.246**	.441	.464	1.000	.306
	Q73R	**.261**	**.184**	**.202**	**.234**	**.170**	**.213**	**.208**	**.268**	.411	.306	1.000
Sig. (1-tailed)	Q63		.000	.000	.000	.000	.000	.000	.011	.000	.001	.000
	Q64	.000		.000	.000	.000	.001	.000	.000	.008	.001	.003
	Q65	.000	.000		.000	.000	.000	.000	.009	.000	.012	.001
	Q66	.000	.000	.000		.000	.000	.000	.001	.000	.000	.000
	Q67	.000	.000	.000	.000		.000	.000	.004	.000	.006	.006
	Q68	.000	.001	.000	.000	.000		.000	.002	.002	.001	.001
	Q69	.000	.000	.000	.000	.000	.000		.000	.000	.000	.001
	Q70R	.011	.000	.009	.001	.004	.002	.000		.000	.000	.000
	Q71R	.000	.008	.000	.000	.000	.002	.000	.000		.000	.000
	Q72R	.001	.001	.012	.000	.006	.001	.000	.000	.000		.000
	Q73R	.000	.003	.001	.000	.006	.001	.001	.000	.000	.000	

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.806
Bartlett's Test of Sphericity	Approx. Chi-Square	739.328
	df	55
	Sig.	.000

Table 5.22.

***Factor Analysis for the Problem Awareness Scale* (continued)**

Communalities		
	Initial	Extraction
Q63	.489	.523
Q64	.397	.384
Q65	.493	.495
Q66	.524	.503
Q67	.422	.405
Q68	.302	.268
Q69	.373	.380
Q70R	.274	.344
Q71R	.392	.469
Q72R	.350	.480
Q73R	.228	.256

Total Variance Explained							
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	4.152	37.746	37.746	3.578	32.528	32.528	3.373
2	1.503	13.661	51.406	.928	8.433	40.962	2.373
3	.877	7.977	59.383				
4	.816	7.417	66.800				
5	.749	6.806	73.605				
6	.713	6.478	80.083				
7	.563	5.121	85.204				
8	.519	4.721	89.926				
9	.463	4.205	94.130				
10	.385	3.498	97.628				
11	.261	2.372	100.000				

Pattern Matrix[a]		
	Factor	
	1	2
Q63	**.746**	-.090
Q64	**.739**	-.032
Q65	**.712**	-.005
Q66	**.628**	-.018
Q67	**.623**	.025
Q68	**.559**	.099
Q69	**.462**	.094
Q70R	-.059	**.721**
Q71R	.027	**.670**
Q72R	-.011	**.592**
Q73R	.086	**.456**

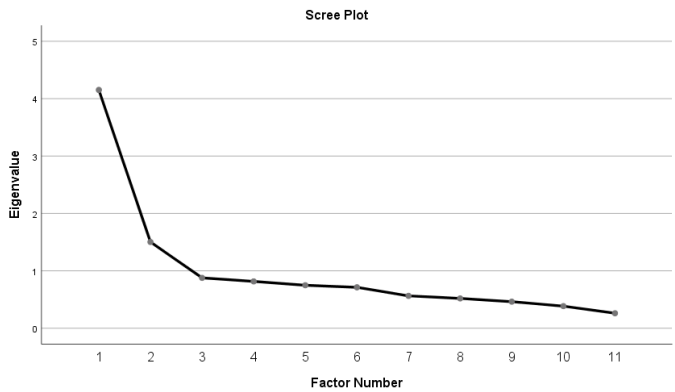


***Figure 5.*10. Scree plot for the Problem Awareness scale**

Items Q63, Q64, Q65, Q66, Q67, Q68 and Q69 loaded on factor1. Items Q70R, Q71R, Q72R and Q73R loaded on factor 2. All the items loading on factor 1 are positively keyed items and those loading on factor 2 are negatively keyed items. The two-factor structure was seen as providing a credible explanation of the observed inter-item correlation matrix with only 23% large residual correlations.

A Problem Awareness measurement model was subsequently fitted in which a single Problem Awareness latent variable was structurally mapped on the items of the subscale, along with two method factors that were structurally mapped on the items in accordance with the loading pattern in the pattern matrix (see Table 5.22). Each item was therefore allowed to load on the Problem Awareness factor and was assigned to either a positively keyed or negatively keyed factor. The fit statistics for the Problem Awareness measurement model is shown in Table 5.23.

Table 5.23.

Confirmatory factor analysis for the Problem Awareness scale

Goodness of Fit Statistics
Degrees of Freedom = 32
Normal Theory Weighted Least Squares Chi-Square=69.683110 P=.12999141D-03)
Satorra-Bentler Scaled Chi-Square = 59.018122 (P = 0.00251842)
Chi-Square Corrected for Non-Normality = 56.413070 (P = 0.00489498)
Estimated Non-centrality Parameter (NCP) = 27.018122
90 Percent Confidence Interval for NCP = (9.250396 ; 52.603848)
Minimum Fit Function Value = 0.0807606
Population Discrepancy Function Value (F0) = 0.122810
90 Percent Confidence Interval for F0 = (0.0420473 ; 0.239108)
Root Mean Square Error of Approximation (RMSEA) = 0.0619500
90 Percent Confidence Interval for RMSEA = (0.0362488 ; 0.0864415)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.200528

The LISREL Goodness of fit statistics output indicates that the Satorra-Bentler chi-square statistic is statistically significant (p<.05). This shows that the exact fit null hypothesis was

rejected. The close fit null hypothesis was not rejected (RMSEA=.062; p>.05), indicating that the model fitted the data approximately in the parameter. The path diagram of the completely standardised solution of the fitted measurement model is shown in Figure 5.11. The finding of close fit warranted the interpretation of the parameter estimates.

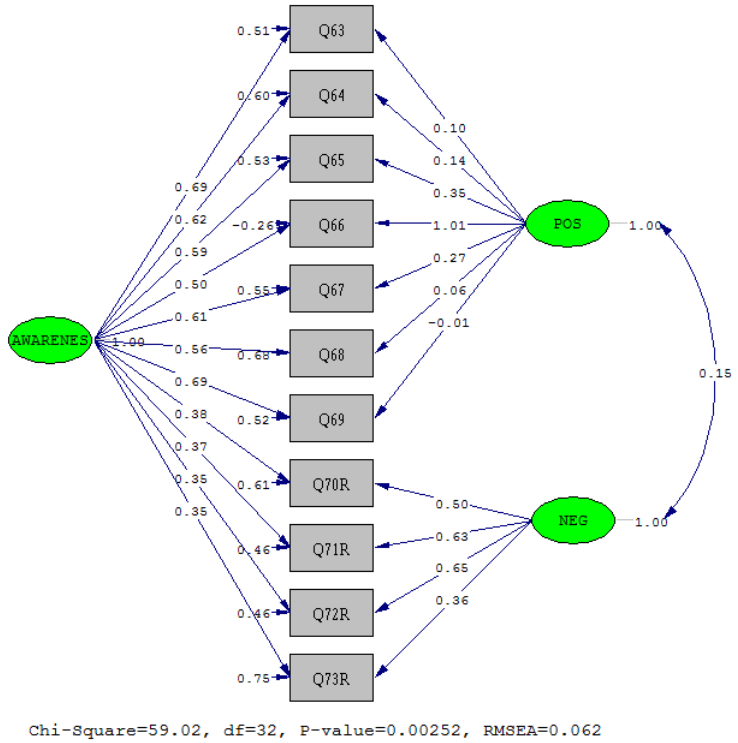


Figure 5.11. **First-order Problem Awareness Measurement Model with Two Method Factors (completely standardised solution)**

The statistical significance of the unstandardised factor loadings of the items on the Problem Awareness factor and the two method factors was assessed by examining the z-statistics in Table 5.24.

Table 5.24.

Problem Awareness unstandardized lambda-X matrix

	AWARENES	POS	NEG
Q63	0.395895*	0.058560	- -
	(0.188431)	(0.424519)	
	2.101003	0.137943	
Q64	0.353182*	0.080581	- -
	(0.155697)	(0.398030)	
	2.268397	0.202450	
Q65	0.518051*	0.302556	- -
	(0.313902)	(1.102530)	
	1.650361	0.274420	
Q66	0.411105	0.821413	- -
	(0.481010)	(3.377012)	
	0.854671	0.243237	
Q67	0.377469*	0.164229	- -
	(0.218302)	(0.615047)	

Table 5.24.

Problem Awareness unstandardized lambda-X matrix

	1.729113	0.267019	
Q68	0.368648*	0.039913	- -
	(0.132136)	(0.209198)	
	2.789921	0.190790	
Q69	0.633944	-0.006216	- -
	(0.392608)	(0.657414)	
	1.614698	-0.009456	
Q70R	0.456899*	- -	0.600022*
	(0.080494)		(0.098382)
	5.676220		6.098887
Q71R	0.284119*	- -	0.485381*
	(0.081126)		(0.126657)
	3.502204		3.832255
Q72R	0.329030*	- -	0.609922*
	(0.088404)		(0.149376)
	3.721899		4.083127
Q73R	0.295386*	- -	0.299366*
	(0.072064)		(0.087571)
	4.098962		3.418549

* (p<.05)
AWARENES= Problem Awareness
POS= Positive
NEG= Negative

Table 5.24 shows that two of the positively keyed items (Q66 and Q69) loaded statistically insignificantly (p>.05) on the Problem Awareness factor. All the remaining positively keyed items loaded statistically significantly (p<.05) on the Problem Awareness factor.[32] All positively keyed items loaded statistically insignificantly (p>.05) on the positively keyed latent variable. This was not considered a problem. Table 5.24 shows that all the negatively keyed items loaded statistically significantly (p<.05) on both the Problem Awareness factor and the negatively keyed factor. The completely standardised factor loadings are shown in Table 5.25.

Table 5.25.

Problem Awareness Completely Standardized Lambda-X Matrix

	AWARENES	POS	NEG
Q63	0.692858	0.102485	- -
Q64	0.618105	0.141025	- -
Q65	0.593581	0.346667	- -
Q66	0.502998	1.005019	- -
Q67	0.612826	0.266628	- -
Q68	0.560878	0.060725	- -
Q69	0.692052	-0.006786	- -
Q70R	0.380041	- -	0.499088
Q71R	0.370031	- -	0.632152
Q72R	0.348032	- -	0.645145
Q73R	0.354211	- -	0.358984

*AWARENES= Problem Awareness
*POS= Positive
*NEG= Negative

[32] The statistical significance of all factor loadings was tested by testing H_{0p}: $\lambda ij=0$ against H_{ap}: $\lambda_{ij}>0$ via a one-tailed test.

Table 5.25 indicates that all of the statistically significant ($p<.05$) factor loading estimates for the positively keyed items on the Problem Awareness latent variable in the completely standardized solution Λ^{x} are large (λ_{ij} >.50). The completely standardized factor loadings of the negatively keyed items on the Problem Awareness factor all fall below the λ_{ij} >.50 cut-off. The negatively keyed items generally load higher on the negatively keyed method factor. This was regarded a weakness of the scale.

Despite the lower loadings (but still statistically significant) of the negatively keyed items on the Problem Awareness latent variable and the statistically insignificant loadings of two positively keyed items on the Problem Awareness factor, the Problem Awareness items were evaluated as providing a sufficiently valid reflection of the Problem Awareness factor.

5.5.10. Internal Attribution

The correlation matrix, for the Internal Attribution scale, depicted in Table 5.26, showed that all correlations were reasonably high (≥.30) and statistically significant ($p<.05$). Furthermore, a KMO of .897 (>.60) was obtained and the Bartlett's Test of Sphericity returned a statistically significant chi-square statistic ($p<.05$) which allowed for the identity matrix null hypothesis to be rejected. This presented strong evidence that the correlation matrix was factor analysable.

One factor was extracted since only one factor obtained an eigenvalue greater than one (4.043 > 1). The scree plot, shown in Figure 5.12, confirmed that a single factor should be extracted. The factor matrix reveals that all the items loaded onto one factor satisfactorily since all factor loadings were larger than .50 (λ_{i1} ≥.50). Lastly, only 2 (13%) of the nonredundant residuals obtained absolute values greater than .05. This suggests that the factor structure provided a reasonably satisfactory and credible explanation for the observed correlation matrix. The unidimensionality assumption, for the Internal Attribution scale, was thus corroborated.

Table 5.26.

Factor analysis for the Internal Attribution scale

Correlation Matrix[a]							
		Q74	Q75	Q76	Q77	Q78	Q79
Correlation	Q74	1.000	.723	.527	.732	.666	.543
	Q75	.723	1.000	.561	.712	.583	.591
	Q76	.527	.561	1.000	.580	.552	.518
	Q77	.732	.712	.580	1.000	.718	.570
	Q78	.666	.583	.552	.718	1.000	.512
	Q79	.543	.591	.518	.570	.512	1.000
Sig. (1-tailed)	Q74		.000	.000	.000	.000	.000
	Q75	.000		.000	.000	.000	.000
	Q76	.000	.000		.000	.000	.000
	Q77	.000	.000	.000		.000	.000
	Q78	.000	.000	.000	.000		.000
	Q79	.000	.000	.000	.000	.000	

Table 5.26.

***Factor analysis for the Internal Attribution scale* (continued)**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.897
Bartlett's Test of Sphericity	Approx. Chi-Square	776.589
	df	15
	Sig.	.000

Communalities		
	Initial	Extraction
Q74	.646	.696
Q75	.629	.677
Q76	.430	.467
Q77	.685	.761
Q78	.578	.607
Q79	.431	.466

Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.043	67.391	67.391	3.673	61.214	61.214
2	.555	9.246	76.637			
3	.500	8.328	84.965			
4	.405	6.751	91.716			
5	.259	4.324	96.040			
6	.238	3.960	100.000			

Factor Matrix[a]	
	Factor 1
Q74	.872
Q75	.834
Q76	.823
Q77	.779
Q78	.683
Q79	.683

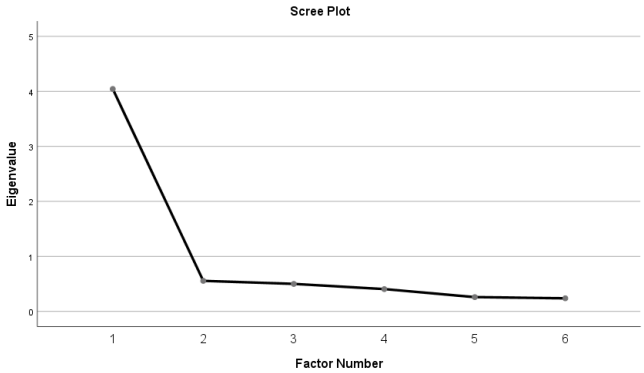


***Figure 5.*12. Scree plot for the Internal Attribution scale**

5.5.11. Confirmatory Factor Analysis of the EGB Scale

The construct validity of the EGB scale was evaluated by fitting the measurement model implied by the constitutive definition of the multidimensional EGB construct and the design

intention underpinning the development of the scale. The multivariate normality assumption was not met. The data was not normalised. Robust maximum likelihood estimation was used to derive estimates for the freed measurement model parameters. Two EGB measurement model fit hypotheses were tested by testing the statistical null hypotheses for exact and close model fit for the EGB measurement model. The relevant fit statistics are shown in Table 5.27.

Table 5.27.

Confirmatory factor analysis for the EGB Scale

Goodness of Fit Statistics
Degrees of Freedom = 94
Minimum Fit Function Chi-Square = 246.627820 (P = 0.00)
Normal Theory Weighted Least Squares Chi-Square = 266.646929 (P = 0.0)
Satorra-Bentler Scaled Chi-Square = 240.640541 (P = 0.00)
Chi-Square Corrected for Non-Normality = 382.221424 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 146.640541
90 Percent Confidence Interval for NCP = (104.651161 ; 196.311005)
Minimum Fit Function Value = 1.121036
Population Discrepancy Function Value (F0) = 0.666548
90 Percent Confidence Interval for F0 = (0.475687 ; 0.892323)
Root Mean Square Error of Approximation (RMSEA) = 0.0842077
90 Percent Confidence Interval for RMSEA = (0.0711372 ; 0.0974310)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.000021

The LISREL output file indicates that the Satorra-Bentler chi-square statistic is statistically significant ($p<.05$). This shows that the exact fit null hypothesis had to be rejected. Additionally, the close fit null hypothesis also had to be rejected ($p<.05$).

Figure 5.13 indicated that there were a substantial number of statistically significant ($p<.01$) modification indices calculated for the off-diagonal of the theta-delta matrix of the first-order EGB measurement model. This implied that the model fit would improve statistically significantly ($p<.01$) if the measurement error terms associated with the EGB scale items would be allowed to correlate. The measurement error terms represent random and (unknown) systematic influences that affect the items of the scale in addition to the latent dimensions that the scale was designed to reflect. The fact that the model fit would improve if these error terms would be allowed to correlate suggests that the items of the EGB scale could also reflect a general source of systematic variance currently not acknowledged by the model (i.e. a more general EGB factor). This, as well as evidence that the EGB measurement model does not show exact or close fit, led to the fitting of a bi-factor EGB measurement model. A subset of the fit statistics for the bi-factor EGB model are shown in Table 5.28.

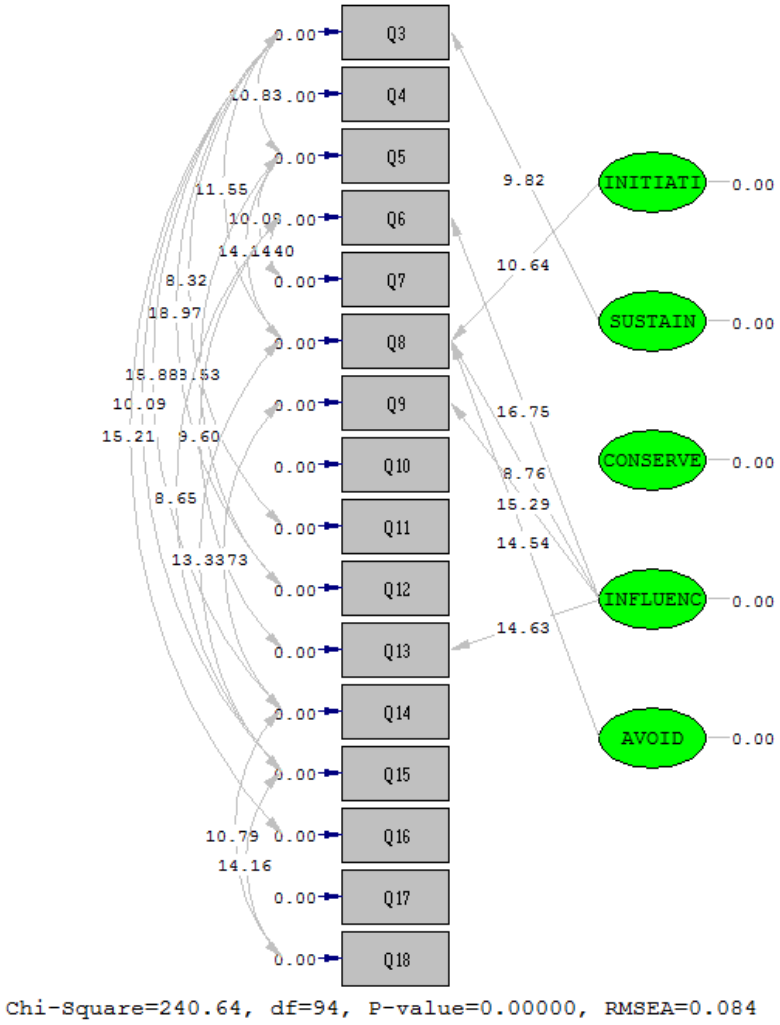


***Figure 5.13*. Modification indices calculated for the EGB first-order measurement model**

Table 5.28.

Factor analysis for the bi-factor measurement model of the EGB scale

Goodness of Fit Statistics
Degrees of Freedom = 78
Minimum Fit Function Chi-Square = 135.528694 (P = 0.000059)
Normal Theory Weighted Least Squares Chi-Square=132.470329 (P=.11745553D-03)
Satorra-Bentler Scaled Chi-Square = 122.722990 (P = .92735952D-03)
Chi-Square Corrected for Non-Normality = 212.304679 (P = 0.00)
Estimated Non-centrality Parameter (NCP) = 44.722990
90 Percent Confidence Interval for NCP = (18.521889 ; 78.856132)
Minimum Fit Function Value = 0.616040
Population Discrepancy Function Value (F0) = 0.203286
90 Percent Confidence Interval for F0 = (0.0841904 ; 0.358437)
Root Mean Square Error of Approximation (RMSEA) = 0.0510513
90 Percent Confidence Interval for RMSEA = (0.0328537 ; 0.0677890)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.441696

The LISREL Goodness of fit statistics output shown in Table 5.28, indicates that the Satorra-Bentler chi-square statistic is statistically insignificant (p>.05). This shows that the exact fit null hypothesis (H_{018a}) was not rejected. Also, the close fit null hypothesis (H_{018b}) could not be rejected (RMSEA=.051; p>.05), indicating that the model fits the data approximately. The findings of exact fit warranted the interpretation of the parameter estimates. The path diagram of the EGB bi-factor measurement model depicting the completely standardised solution is shown in Figure 5.14. The unstandardised factor loading matrix ΛX is shown in Table 5.29.

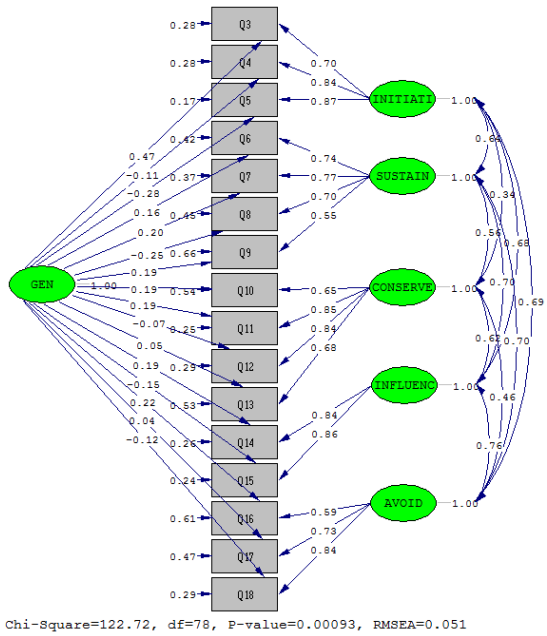


Figure 5.14. ***Bi-factor EGB measurement model (completely standardised solution)***

Table 5.29.

EGB unstandardized lambda-X matrix

	INITIATI	SUSTAIN	CONSERVE	INFLUENC	AVOID	GEN
Q3	0.567573*	- -	- -	- -	- -	0.380046*
	0.078268)					(0.092333)
	7.251692					4.116036
Q4	0.986619*	- -	- -	- -	- -	-0.128702
	(0.067915)					(0.188127)
	14.527221					-0.684123
Q5	1.067605*	- -	- -	- -	- -	-0.349660*
	(0.084595)					(0.200180)
	12.620243					-1.746729
Q6	- -	0.688653*	- -	- -	- -	0.146064
		(0.060259)				(0.124459)
		11.428135				1.173595
Q7	- -	0.729768*	- -	- -	- -	0.187005
		(0.060921)				(0.134419)
		11.978949				1.391204
Q8	- -	0.852744*	- -	- -	- -	-0.306363*
		(0.091753)				(0.135516)
		9.293930				-2.260707
Q9	- -	0.489565*	- -	- -	- -	0.169066*
		(0.063672)				(0.102439)
		7.688816				1.650402

Table 5.29.

Q10	- -	- -	0.593381*	- -	- -	0.168273*
			(0.061116)			(0.095459)
			9.709086			1.762784
Q11	- -	- -	0.831504*	- -	- -	0.182070*
			(0.053135)			(0.103219)
			15.648756			1.763916
Q12	- -	- -	0.890201*	- -	- -	-0.074756
			(0.053623)			(0.124815)
			16.601016			-0.598936
Q13	- -	- -	0.725577*	- -	- -	0.054902
			(0.066641)			(0.108826)
			10.887895			0.504495
Q14	- -	- -	- -	0.903880*	- -	0.208113
				(0.063129)		(0.155056)
				14.318050		1.342177
Q15	- -	- -	- -	1.037395*	- -	-0.178438
				(0.066049)		(0.160324)
				15.706356		-1.112984
Q16	- -	- -	- -	- -	0.520269*	0.190985*
					(0.062562)	(0.101693)
					8.316062	1.878054
Q17	- -	- -	- -	- -	0.840943*	0.044563
					(0.065927)	(0.153968)
					12.755590	0.289431
Q18	- -	- -	- -	- -	0.961909*	-0.139799
					(0.067621)	(0.148599)
					14.225081	-0.940781

EGB unstandardized lambda-X matrix (continued)

* (p<.05)
INITIATI= Taking Initiative
SUSTAIN= Working Sustainably
CONSERVE= Conserving
INFLUENC= Influencing Others
AVOID= Avoiding Harm
GEN= General

All items loaded statistically significantly (p<.05) on the narrow, specific latent dimension that they were designated to reflect. Most items loaded statistically insignificantly (p>.05) on the general broad EGB factor. Items Q3, Q5, Q8, Q9, Q11 and Q16 were the only exceptions. Although not ideal, the EGB was in the first instance designed and developed to render measures on the narrow, specific latent EGB dimensions. All items at least statistically significantly (p<.05) reflected the latent dimension they were earmarked to reflect. Whether they sufficiently validly reflected the latent dimension of interest was determined by inspecting the completely standardised factor loading matrix shown in Table 5.30.

Table 5.30.

EGB completely standardized lambda-X matrix

	INITIATI	SUSTAIN	CONSERVE	INFLUENC	AVOID	GEN
Q3	0.704266	- -	- -	- -	- -	0.471575
Q4	0.840967	- -	- -	- -	- -	-0.109702
Q5	0.865453	- -	- -	- -	- -	-0.283452
Q6	- -	0.742676	- -	- -	- -	0.157523
Q7	- -	0.771573	- -	- -	- -	0.197718
Q8	- -	0.699057	- -	- -	- -	-0.251148

Table 5.30.

EGB completely standardized lambda-X matrix (continued)

Q9	- -	0.554701	- -	- -	- -	0.191560
Q10	- -	- -	0.653205	- -	- -	0.185238
Q11	- -	- -	0.846145	- -	- -	0.185276
Q12	- -	- -	0.838947	- -	- -	-0.070452
Q13	- -	- -	0.680972	- -	- -	0.051527
Q14	- -	- -	- -	0.838616	- -	0.193086
Q15	- -	- -	- -	0.859288	- -	0.147802
Q16	- -	- -	- -	- -	0.587368	0.215617
Q17	- -	- -	- -	- -	0.730313	0.038701
Q18	- -	- -	- -	- -	0.835209	-0.121385

INITIATI= Taking Initiative
SUSTAIN= Working Sustainably
CONSERVE= Conserving
INFLUENC= Influencing Others
AVOID= Avoiding Harm
GEN= General

Additionally, the LISREL output indicates that all the freed factor loadings of the items on the narrow, specific EGB latent dimensions in the completely standardized solution Λ^{x} were large (λ_{ij} >.50). The factor loadings of the items that loaded statistically significantly (p<.05) on the broad, general EGB factor were generally small. The unstandardised theta-delta-matrix is shown in Table 5.31. Table 5.31 indicates that all EGB items were statistically significantly (p<.05) plagued by systematic and random measurement error.

Table 5.31.

EGB unstandardized theta-delta matrix

Q3*	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**
0.182912	0.386408*	0.259675*	0.364232*	0.327039*	0.667001*
(0.056825)	(0.085100)	(0.069657)	(0.044184)	(0.044871)	(0.105494)
3.218865	4.540657	3.727888	8.243574	7.288480	6.322615
Q9	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**
0.510682*	0.444799*	0.241145*	0.327872**	0.605819	0.301395*
(0.053118)	(0.074051)	(0.049381)	(0.061163)	(0.074029)	(0.051463)
9.614036	6.006615	4.883376	5.360590	8.183548	5.856485
Q15	**Q16**	**Q17**	**Q18**		
0.349478*	0.477420*	0.616744*	0.381597*		
0.072136)	(0.049527)	(0.075391)	(0.079575)		
4.844737	9.639595	8.180650	4.795460		

* (p<.05)

The completely standardised theta-delta matrix is shown in Table 5.32. In the case of all items, but for Q9, Q10, Q13 and Q16, less than 50% of the variance in the items was due to measurement error. Given that completely standardised factor loadings of individual items

(rather than item parcels) were considered satisfactory if λ_{ij} exceeded .50, all measurement error variances depicted in Table 5.32 had to be considered satisfactory[33].

Table 5.32.

EGB completely standardized theta-delta matrix

Q6	**Q3**	**Q4**	**Q5**	**Q7**	**Q8**
0.423620	0.281626	0.280741	0.170646	0.365582	0.448244
Q12	**Q9**	**Q10**	**Q11**	**Q13**	**Q14**
0.291204	0.655612	0.539010	0.249712	0.533623	0.259442
Q18	**Q15**	**Q16**	**Q17**		
0.287692	0.239778	0.608508	0.465146		

The proportion of variance in each item explained by the weighted linear combination of the narrow, specific latent EGB dimension it was designated to reflect and the broad, general EGB factor is shown in Table 5.33. These were generally very satisfactory with more than 50% of the item variance being explained by the two factors that the item was structurally linked to. The same items that were flagged above again stand out as the items that provide a less valid description of EGB.

Table 5.33.

EGB squared multiple correlations for X - variables

Q3	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**
0.718374	0.719259	0.829354	0.576380	0.634418	0.551756
Q9	**Q10**	**Q11**	**Q12**	**Q13**	**Q14**
0.344388	0.460990	0.750288	0.708796	0.466377	0.740558
Q15	**Q16**	**Q17**	**Q18**		
0.760222	0.391492	0.534854	0.712308		

5.6. DATA SCREENING PRIOR TO FITTING THE EGB MEASUREMENT MODEL AND STRUCTURAL MODEL

The EGB structural model was fitted using composite indicator variables calculated by forming item parcels or dimension scores (in the case of the EGB latent variable). The formation of these composite indicator variables was described in Chapter 3 in paragraph 3.6. It was decided to use dimension scores for EGB and to calculate item parcels for the other latent variables to operationalise the latent variables in the model. As such, item parcels were formed by randomly combining items and calculating the means. In most cases, two or more item parcels thus represent the latent variables.

[33] It, however needs to be considered that in this case $\theta_{\delta ii}$ is given by the sum of the squared factor loadings of the ith item on the narrow, specific factor it was designated to reflect the broad, general factor.

As such, composite indicator variables were created for all of the latent variables. Two item parcels were calculated for each latent variable by taking the mean of the even and uneven numbered items of the scales to form two indicator variables. By summing the product of two components of certain latent variables over the even and uneven numbered behavioural outcomes respectively, two parcels were formed to serve as indicators of these latent variables (e.g. PBC, GSN, Green Attitude). Five parcels were formed to serve as indicators of the EGB latent variable. These composite indicator variables were considered continuous variables.

As mentioned in Chapter 3, the intention was to use the ML estimation method to analyse the continuous composite indicator data, and this estimation technique assumes that the indicator variables follow a multivariate normal distribution (Theron, 2016f). By default, LISREL uses the ML estimation technique to obtain estimates for the freed model parameters and assumes that the indicator variables follow a multivariate normal distribution. This assumption of univariate and multivariate normality was first tested through PRELIS (Jöreskog & Sörbom, 1996). The results of the initial test of multivariate normality is shown in Table 5.34.

Table 5.34.

Test of multivariate normality before normalisation

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
71.240	12.512	0.000	525.516	7.847	0.000	218.120	0.000

The test of multivariate normality suggested that the null hypothesis of multivariate normality had to be rejected ($p<.05$) for the multivariate indicator variable distribution. This confirms that the data does not follow a multivariate normal distribution. Based on the outcome on the test for multivariate normality, it was decided to attempt normalisation, so as to allow analysis of the normalised data and to still use ML estimation. The results of the second test of multivariate normality on the normalised data is shown in Table 5.35.

Table 5.35.

Test of multivariate normality after normalisation

Skewness			Kurtosis			Skewness and Kurtosis	
Value	Z-Score	P-Value	Value	Z-Score	P-Value	Chi-Square	P-Value
61.521	7.656	0.000	512.472	6.177	0.000	96.764	0.000

The test of multivariate normality on the normalised indicator variable data set i.e. (after normalisation) suggested that the null hypothesis of multivariate normality still had to be rejected ($p<.05$). The multivariate normality assumption is thus still not satisfied. Nonetheless, the chi-square statistic decreased, which meant that the normalisation procedure succeeded in reducing the deviation of the observed composite indicator distribution from the theoretical

multivariate normal distribution. Based on the outcome on the test for multivariate normality after normalisation, it was decided to use robust maximum likelihood estimation (RML) to derive model parameter estimates from the observed covariance matrix. The normalised dataset was utilised in the subsequent (RML estimation) analyses.

5.7. EVALUATING THE EGB MEASUREMENT MODEL

Prior to testing the validity of the EGB structural model, the EGB measurement model was fitted via CFA to test the extent to which the operationalisation of the latent variables in the structural model was successful. CFA was used to evaluate measurement model fit, as it produces the series of LISREL model fit indices. Operationalisation was seen as successful if the measurement model reflecting the allocation of composite indicator variables to the latent variables at least showed close fit (i.e. if the close fit null hypothesis was not rejected), if the unstandardised factor loadings were statistically significant ($p<.05$), if the completely standardised factor loadings were sufficiently large ($\lambda_{ij}\geq.71$), if the unstandardised measurement error variance were statistically significant ($p<.05$), if the completely standardised measurement error variances were small ($\theta_{\delta ii}\leq.50$) and if the inter-latent variables did not approach unity. The measurement model analysis is discussed by evaluating the overall model fit by interpreting the model fit indices as reported by LISREL, assessing and interpreting the measurement model residuals and assessing and interpreting the modification indices. If at least reasonable model fit was found the measurement model parameter estimates were interpreted.

5.7.1. Examining the EGB Measurement Model Fit Statistics

Firstly, two overarching measurement model fit hypotheses were tested. The statistical null hypotheses for exact and close model fit for the measurement model were formulated as:

Exact fit null hypothesis:

H_{018a}: RMSEA = 0

H_{a18a}: RMSEA > 0

Close fit null hypothesis:

H_{018b}: RMSEA ≤ .05

H_{a18b}: RMSEA > .05

The fit of the EGB measurement model (item parcels) is discussed in the following section. The full array of fit statistics produced by LISREL 8.8 is shown in Table 5.36.

Table 5.36.

The goodness of fit statistics for the EGB measurement model

Goodness of Fit Statistics
Degrees of Freedom = 153
Minimum Fit Function Chi-Square = 286.6222 (P = 0.00)
Normal Theory Weighted Least Squares Chi-Square = 276.1332 (P = 0.00)
Satorra-Bentler Scaled Chi-Square = 265.0284 (P = 0.0000)
Chi-Square Corrected for Non-Normality = 773.3304 (P = 0.0)
Estimated Non-centrality Parameter (NCP) = 112.0284
90 Percent Confidence Interval for NCP = (70.7451 ; 161.1781)
Minimum Fit Function Value = 1.3028
Population Discrepancy Function Value (F0) = 0.5092
90 Percent Confidence Interval for F0 = (0.3216 ; 0.7326)
Root Mean Square Error of Approximation (RMSEA) = 0.05769
90 Percent Confidence Interval for RMSEA = (0.04584 ; 0.06920)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.1368
Expected Cross-Validation Index (ECVI) = 1.9138
90 Percent Confidence Interval for ECVI = (1.7261 ; 2.1372)
ECVI for Saturated Model = 2.1000
ECVI for Independence Model = 32.2112
Chi-Square for Independence Model with 210 Degrees of Freedom = 7044.4615
Independence AIC = 7086.4615
Model AIC = 421.0284
Saturated AIC = 462.0000
Independence CAIC = 7178.8230
Model CAIC = 764.0851
Saturated CAIC = 1477.9756
Normed Fit Index (NFI) = 0.9624
Non-Normed Fit Index (NNFI) = 0.9775
Parsimony Normed Fit Index (PNFI) = 0.7012
Comparative Fit Index (CFI) = 0.9836
Incremental Fit Index (IFI) = 0.9837
Relative Fit Index (RFI) = 0.9484
Critical N (CN) = 164.2052
Root Mean Square Residual (RMR) = 7.5917
Standardized RMR = 0.03966
Goodness of Fit Index (GFI) = 0.8932
Adjusted Goodness of Fit Index (AGFI) = 0.8388
Parsimony Goodness of Fit Index (PGFI) = 0.5916

The LISREL Goodness of fit statistics output, shown in Table 5.36, indicated that the Satorra-Bentler chi-square statistic, based on the RML estimation procedure, was statistically significant ($p<.05$). This shows that the exact fit null hypothesis (H_{018a}) had to be rejected and the model did not fit exactly.

The close fit null hypothesis (H_{018b}) could not be rejected ($p>.05$), indicating that the position that the model fitted the data closely in the parameter was a permissible position to hold. Although the item parcel measurement model only showed reasonable fit (RMSEA=.05769) in the sample, the probability of obtaining such a result in the sample under the hypothesis that the model fitted closely (RMSEA=.05) in the parameter was sufficiently large ($p=.1368$) not to reject the close fit hypothesis. Figure 5.15. is a visual representation of the fitted EGB

measurement model using item parcels. The finding of close fit warranted that the parameter estimates can be interpreted.

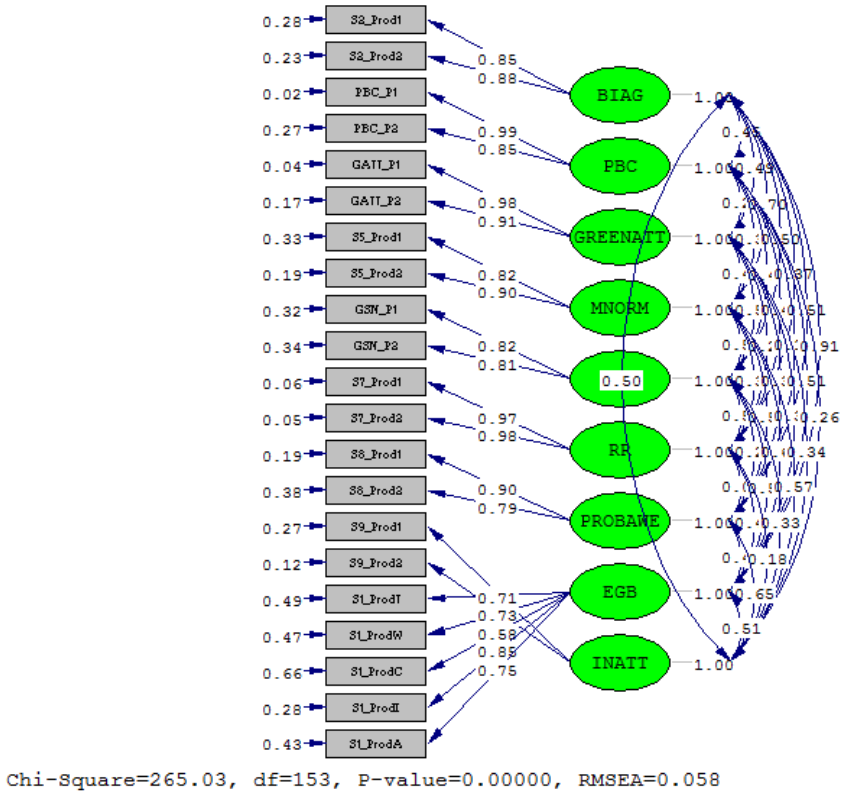


Figure 5.15. ***Representation of the fitted EGB measurement model (completely standardised solution)***

The fitting of the EGB measurement model ignored the distinction between the exogenous and endogenous measurement models. A single exogenous measurement model was assumed when testing the success of the operationalisation of the latent variables comprising the EGB structural model.

5.7.2. Examining the Measurement Model Residuals

The standardised model variance-covariance residuals were examined as part of the evaluation of the measurement model fit. The LISREL output in Table 5.37. indicates that the EGB measurement model's standardised residuals comprised of 5 negative and 4 positive residuals. Hence, there were only 9 extreme residuals, and the percentage of large residuals can be calculated as 3.9% (9/ [(21*22)/2]=9/231=.0386961). This small percentage of large standardised residuals implied that the fitted model was able to highly accurately reproduce the observed inter-indicator variance-covariance matrix. This in turn supported the conclusion of close measurement model fit.

Table 5.37.

Summary Statistics for the Standardised Residuals

	Value
Summary Statistics for Standardized Residuals	
Smallest Standardized Residual	-5.8394
Median Standardized Residual	0.0000
Largest Standardized Residual	2.9114
Largest Negative Standardized Residuals	
Residual for S8_Prod2 and PBC_P1	-3.1281
Residual for S1_ProdT and S2_Prod1	-2.9668
Residual for S1_ProdC and S1_ProdT	-3.2856
Residual for S1_ProdI and S5_Prod1	-3.8110
Residual for S1_ProdI and S9_Prod1	-5.8394
Largest Positive Standardized Residuals	
Residual for S1_ProdT and S5_Prod2	2.7860
Residual for S1_ProdC and S2_Prod1	2.8603
Residual for S1_ProdC and GATT_P1	2.9114
Residual for S1_ProdC and GATT_P2	2.7186

5.7.3. Examining the Modification Indices

As part of the evaluation of the fit of the EGB measurement model the modification indices calculated for the factor loading matrix (lambda matrix) and the theta-delta matrix were examined. LISREL suggested a couple of ways to improve the fit of the model through suggested paths that will have a statistically significant positive impact on the model fit ($p<.01$). The modification indices were calculated for Λ^x and θ_δ.

The LISREL modification index output for Λ^x indicated that there were 6 statistically significant ($p<.01$) modification indices which could be considered to be freed, as they exceed the critical chi-square value of 6.6349. Consequently, the percentage of large modification indices were calculated as 3.57% (6/[(21*9)-21]=6/168=.03571). The LISREL modification index output for Θ_δ indicated that there were 11 modification indices that could be considered to be freed, as they exceed the critical chi-square value of 6.6349. Consequently, the percentage of large modification indices were calculated as 5.24% (11/[21*20)/2]=11/210=.05238). For both lambda-X and theta-delta (Λ^x and θ_δ), there were very small percentages of large modification indices. This therefore means that of all the possible ways of expanding the model only a limited number of additions would improve the fit of the model significantly ($p<.01$). This is seen as positive evidence contributing to the interpretation of good model fit.

5.7.4. Integrative Verdict on Measurement Model Fit

The examination of the goodness of fit indices, the presence of large standardised variance-covariance residuals and the presence of statistically significant modification indices

unanimously indicated reasonable to close measurement model fit. This warranted the interpretation of the measurement model parameter estimates.

5.7.5. Examining the Parameter Estimates

As discussed in Chapter 3, operationalisation is seen as successful if the (completely standardised) factor loadings (lambda estimates) are statistically significant ($p<.05$) and large, and the error variances were statistically significant ($p<.05$) and small (Theron, personal communication, August 10, 2016). In terms of CFA when using composite indicator variables, the critical cut-off value for factor loadings to be considered satisfactory is when $\lambda_{ij} >.71$ in the completely standardised solution. This critical cut-off value was used to interpret the factor loadings of the item parcels in the measurement model. Small error variance (theta-delta, $\theta_{\delta jj}$) was preferred (with a critical value $\leq.50$), implying that less than 50% of the indicator variable variance was due to measurement error.

Since the measurement model shows reasonable close fit, the following factor loading null hypotheses, measurement error variance hypotheses, as well as the latent variable covariance null hypotheses, were evaluated and tested:

5.7.5.1. Lambda-X Hypotheses

The factor loading estimates were interpreted by testing the following null hypotheses:

H_{0i}: $\lambda_{jk}=0$; i=19, 20, …, 39; j=1, 2, …, 21; k=1, 2, …, 9

H_{ai}: $\lambda_{jk}\neq0$; i=19, 20, …, 39; j=1, 2, …, 21; k=1, 2, …, 9

As seen in the LISREL output in Table 5.38., the unstandardised Lambda-X (Λ^{x}) matrix illustrates that the factor-loading were statistically significant ($p<.05$). H_{0i} were tested via one-tailed significance testes since H_{ai} were formulated as directional alternative hypotheses. Because $z\geq1.6449$, all of the λ estimates are statistically significant ($p<.05$). As such, H_{0i}: λ_{jk} =0 could therefore be rejected for all i running from 19 to 39, j from 1 to 21, and k running from 1 to 9.

Table 5.38.

Unstandardized lambda-X matrix

	IAG	PBC	GREENATT	MNORM	GSN	RR	PROBAWE	EGB	INATT
S2_Prod1	0.6889* (0.0448) 15.3752	- -	- -	- -	- -	- -	- -	- -	- -
S2_Prod2	0.8326* (0.0494) 16.8407	- -	- -	- -	- -	- -	- -	- -	- -
PBC_P1	- -	31.0456* (1.8637) 16.6577	- -	- -	- -	- -	- -	- -	- -

Table 5.38.

Unstandardized lambda-X matrix (continued)

PBC_P2	- -	18.7153* (1.2694) 14.7432	- -	- -	- -	- -	- -	- -	- -
GATT_P1	- -	- -	33.1905* (1.6390) 20.2506	- -	- -	- -	- -	- -	- -
GATT_P2	- -	- -	30.5589* (1.8518) 16.5023	- -	- -	- -	- -	- -	- -
S5_Prod1	- -	- -	- -	0.9743* (0.0667) 14.6124	- -	- -	- -	- -	- -
S5_Prod2	- -	- -	- -	1.2070* (0.0721) 16.7311	- -	- -	- -	- -	- -
GSN_P1	- -	- -	- -	- -	17.4712* (1.2798) 13.6517	- -	- -	- -	- -
GSN_P2	- -	- -	- -	- -	15.7974* (1.2575) 12.5623	- -	- -	- -	- -
S7_Prod1	- -	- -	- -	- -	- -	1.6094* (0.0751) 21.4187	- -	- -	- -
S7_Prod2	- -	- -	- -	- -	- -	1.6277* (0.0713) 22.8308	- -	- -	- -
S8_Prod1	- -	- -	- -	- -	- -	- -	0.453* (0.0261) 17.3292	- -	- -
S8_Prod2	- -	- -	- -	- -	- -	- -	0.4365* (0.0296) 14.7659	- -	- -
S9_Prod1	- -	- -	- -	- -	- -	- -	- -	- -	0.4715* (0.0289) 16.3032
S9_Prod2	- -	- -	- -	- -	- -	- -	- -	- -	0.5321* (0.0282) 18.8547
S1_ProdT	- -	- -	- -	- -	- -	- -	- -	0.6607* (0.0564) 11.7105	- -
S1_ProdW	- -	- -	- -	- -	- -	- -	- -	0.5589* (0.0472) 11.8354	- -
S1_ProdC	- -	- -	- -	- -	- -	- -	- -	0.4790* (0.0514) 9.3284	- -
S1_ProdI	- -	- -	- -	- -	- -	- -	- -	0.8923* (0.0530) 16.833	- -
S1_ProdA	- -	- -	- -	- -	- -	- -	- -	0.6577* (0.0481) 13.6711	- -

* (p<.05)
IAG= Intention to Act Green
PBC= Perceived Behavioural Control
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
PROBAWE= Problem Awareness
EGB= Employee Green Behaviour
INATT= Intention to Act Green

In the completely standardised solution (Table 5.39.), the latent variables and indicator variables are all expressed as z-scores. The λ^2 gives the proportion of variance in X explained in terms of the latent variables it represents. The LISREL output indicates that most of the freed factor loadings in the completely standardized solution Λ^X are large (λ_{ij} >.71). Yet, one of the freed factor loadings (Conserving on EGB) do not meet the required cut-off criterion of .71. Nonetheless the slope of the regression of the standardised S1_ProdC on the standardised EGB latent variable was still seen as reasonably large, as it is >.50, which could also be seen as acceptable although not quite satisfactory.

Table 5.39.

Lambda-X completely standardised solution

	IAG	PBC	GREENATT	MNORM	GSN	RR	PROBAWE	EGB	INATT
S2_Prod1	0.8459	- -	- -	- -	- -	- -	- -	- -	- -
S2_Prod2	0.8751	- -	- -	- -	- -	- -	- -	- -	- -
PBC_P1	- -	0.9875	- -	- -	- -	- -	- -	- -	- -
PBC_P2	- -	0.8540	- -	- -	- -	- -	- -	- -	- -
GATT_P1	- -	- -	0.9812	- -	- -	- -	- -	- -	- -
GATT_P2	- -	- -	0.9089	- -	- -	- -	- -	- -	- -
S5_Prod1	- -	- -	- -	0.8196	- -	- -	- -	- -	- -
S5_Prod2	- -	- -	- -	0.9012	- -	- -	- -	- -	- -
GSN_P1	- -	- -	- -	- -	0.8229	- -	- -	- -	- -
GSN_P2	- -	- -	- -	- -	0.8099	- -	- -	- -	- -
S7_Prod1	- -	- -	- -	- -	- -	0.9705	- -	- -	- -
S7_Prod2	- -	- -	- -	- -	- -	0.9765	- -	- -	- -
S8_Prod1	- -	- -	- -	- -	- -	- -	0.8985	- -	- -
S8_Prod2	- -	- -	- -	- -	- -	- -	0.7868	- -	- -
S9_Prod1	- -	- -	- -	- -	- -	- -	- -	- -	0.8563
S9_Prod2	- -	- -	- -	- -	- -	- -	- -	- -	0.9397
S1_ProdT	- -	- -	- -	- -	- -	- -	- -	0.7126	- -
S1_ProdW	- -	- -	- -	- -	- -	- -	- -	0.7306	- -
S1_ProdC	- -	- -	- -	- -	- -	- -	- -	**0.5845**	- -
S1_ProdI	- -	- -	- -	- -	- -	- -	- -	0.8485	- -
S1_ProdA	- -	- -	- -	- -	- -	- -	- -	0.7535	- -

IAG= Intention to Act Green
PBC= Perceived Behavioural Control
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
PROBAWE= Problem Awareness
EGB= Employee Green Behaviour
INATT= Intention to Act Green

5.7.5.2. Theta-delta Hypotheses

The measurement error variance estimates were interpreted by testing the following null hypotheses:

H_{0i}: $\Theta_{\delta jj}$ = 0; i =40, 41, ..., 60; j=1, 2, ..., 21

H_{ai}: $\Theta_{\delta jj} > 0$; i =40, 41, ..., 60; j=1, 2, ..., 21

As seen in the unstandardized Theta-delta matrix, shown in Table 5.40, all of the $\theta_{\delta tt}$ estimates were statistically significant and H_{0i}: $\theta_{\delta jj}$ =0 could be rejected (p<.05) for i =40, 41, 43, 45, 46, 47, 48, 49, 50, 52, 53, 54, 55, 56, 57, 58 , 59, 60. to 60 and j=1, 2, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21 to 21. H_{0i}: $\theta_{\delta jj}$ =0 could, however, not be rejected (p>.05) for i =42, 44, 51 and j=3, 5, 12. All composite indicators were therefore statistically significantly plagued by measurement error except for PBC (Product 1), Green Attitude (Product 2) and Recognition and Reward (Product 2). Although perfect reliability and validity is a desirable ideal, attaining, it nonetheless is worrying. This is because it suggests that in reality, the delta does not cause any variance, which seems to be too good to be true. The completely standardized measurement error variances are shown in Table 5.41.

Table 5.40.

Unstandardized theta-delta matrix

S2_Prod1	**S2_Prod2**	**PBC_P1**	**PBC_P2**	**GATT_P1**	**GATT_P2**
0.1887*	0.2121*	24.5848	130.0481*	42.5829	196.6296*
(0.0267)	(0.0440)	(61.0303)	(26.5211)	(55.1299)	(50.5273)
7.0632	4.8195	**0.4028**	4.9036	**0.7724**	3.8916
S5_Prod1	**S5_Prod2**	**GSN_P1**	**GSN_P2**	**S7_Prod1**	**S7_Prod2**
0.4640*	0.3369*	145.505*	130.873*	0.1600*	0.1293
(0.0756)	(0.0944)	(31.8101)	(23.1804)	(0.0892)	(0.0894)
6.1395	3.5673	4.5742	5.6458	1.7935	**1.4465**
S8_Prod1	**S8_Prod2**	**S9_Prod1**	**S9_Prod2**	**S1_ProdT**	**S1_ProdW**
0.0490*	0.1173*	0.0808*	0.0375*	0.4232*	0.2727*
(0.0148)	(0.0175)	(0.0153)	(0.0179)	(0.0523)	(0.0348)
3.3117	6.6907	5.3006	2.0899	8.0968	7.8384
S1_ProdC	**S1_ProdI**	**S1_ProdA**			
0.4421*	0.3098*	0.3293*			
(0.0418)	(0.0509)	(0.0362)			
10.5873	6.0847	9.0937			

* (p<.05)

In the completely standardised solution of the Theta-delta matrix (Table 5.41.), $\theta_{\delta jj}$ gives the proportion of variance in X explained in terms of measurement error. θ_{δ} indicates the proportion of the variance in the observed variables not explained by the latent variable(s) linked to it, but rather by random error and systematic non-relevant latent variables. Small error variance is preferred (with a critical value ≤.50), meaning that less than 50% of the variance is due to measurement error. The LISREL output confirms that (almost) all of the error variance $\theta_{\delta jj}$ are small (≤.50), except for EGB Conserving (S1_ProdC). But this is not large enough to raise significant concern. Nevertheless, EGB Conserving's larger than preferred error variance is worthy of not removing and constitutes a methodological limitation.

Table 5.41.

Theta-delta completely standardised solution

S2_Prod1	**S2_Prod2**	**PBC_P1**	**PBC_P2**	**GATT_P1**	**GATT_P2**
0.2845	0.2343	0.0249	0.2708	0.0372	0.1739
S5_Prod1	**S5_Prod2**	**GSN_P1**	**GSN_P2**	**S7_Prod1**	**S7_Prod2**
0.3283	0.1878	0.3228	0.3440	0.0582	0.0465
S8_Prod1	**S8_Prod2**	**S9_Prod1**	**S9_Prod2**	**S1_ProdT**	**S1_ProdW**
0.1928	0.3810	0.2667	0.1170	0.4922	0.4662
S1_ProdC	**S1_ProdI**	**S1_ProdA**			
0.6583	0.2801	0.4322			

5.7.5.3. Phi Hypotheses and Discriminant Validity

The latent variable inter-correlation estimates were interpreted by testing the following null hypotheses:

H_{0i}: $\phi_{jk} = 0$; i =61, 62..., 96; j=1, 2....,9; k=1, 2....,9; j≠k

H_{ai}: $\phi_{jk} > 0$; i =61, 62..., 96; j=1, 2....,9; k=1, 2....,9; j≠k

The phi matrix shown as Table 5.42, depicts the correlation between the latent variables. As mentioned in Chapter 3, Discriminant validity refers to the success with which the latent variables can be distinguished from each other via their observed scores. The discriminant validity of the latent performance dimension inferences derived from each set of indicator variables are evaluated in based on the estimates ϕ_{jk} in the phi matrix (**Φ**). Since all as z-scores are sufficiently large (z≥1.96), all of the ϕ_{jk} estimates are seen as statistically significant and H_{0i}: ϕ_{jk} =0 can therefore be rejected for all i running from 61 to 96, j from 1 to 9, and k running from 1 to 9. Certain ϕ_{jk} estimates had to be flagged as the magnitude of the correlation is worrying because the ϕ_{jk} estimate is large (i.e. ϕ_{jk} ≥.90 (IAG and EGB). If these latent variables correlate too high, the issue of discriminant validity could be a problem as this could indicate that the composite indicators designate to the two latent variables failed to distinguish between these two latent variables.

Table 5.42.

Unstandardised phi matrix

	IAG	PBC	GREENATT	MNORM	GSN	RR	PROBAWE	EGB	INATT
IAG	1								
PBC	0.4472	1							
	(0.0739)								
	6.0511								
GREENATT	0.487	0.2919	1						
	(0.0699)	(0.0757)							
	6.9645	3.8556							
MNORM	0.6994	0.3646	0.4832	1					
	(0.0523)	(0.0669)	(0.0678)						
	13.3651	5.4518	7.1228						
GSN	0.4969	0.4289	0.5378	0.5571	1				
	(0.0792)	(0.0693)	(0.0636)	(0.0682)					
	6.2705	6.1916	8.4499	8.1673					
RR	0.3744	0.4162	0.2754	0.3364	0.498	1			
	(0.0719)	(0.0619)	(0.0679)	(0.0685)	(0.0678)				
	5.2071	6.7285	4.0539	4.9136	7.3483				
PROBAWE	0.5077	0.1358	0.363	0.5607	0.2304	0.0476	1		
	(0.0642)	(0.0738)	(0.0714)	(0.0605)	(0.0889)	(0.0811)			
	7.9122	1.8412	5.0832	9.263	2.5926	0.5871			
EGB	**0.9089**	0.5058	0.3888	0.6922	0.5106	0.4694	0.4716	1	
	(0.0314)	(0.0631)	(0.068)	(0.0482)	(0.0663)	(0.0613)	(0.0639)		
	28.907	8.0198	5.7133	14.3505	7.7036	7.6604	7.379		
INATT	0.5041	0.2604	0.3375	0.5696	0.3262	0.184	0.6487	0.5054	1
	(0.0621)	(0.0676)	(0.0656)	(0.0626)	(0.0778)	(0.0689)	(0.0511)	(0.0593)	
	8.1228	3.8512	5.1419	9.0981	4.1943	2.6709	12.7064	8.5294	

A 95% confidence interval was in addition calculated for the ϕ_{81} estimate about which a discriminant validity concern arose, using an Excel macro developed by Scientific Software International (Mels, 2010). If the confidence interval included unity, a problem with discriminant validity was indicated. The confidence interval is shown in Table 5.43.

Table 5.43

95% confidence interval for contentious ϕ_{jk} estimates

ϕ_{ij} Estimate	Standard error	Lower bound	Upper bound	Phi
.9080	.0314	0.823	0.953	ϕ_{81}

The upper bound of the 95% confidence interval for ϕ_{81} falls below 1. With 95% confidence one can therefore conclude that the parametric ϕ_{81} is not 1.

5.7.5.4. Examining the Squared Multiple Correlations for the Composite Indicators

The R^2 indicates the proportion of the variance in the observed variable that is explained by the latent variable(s) linked to it in the measurement model. Most of the items have sufficiently large R^2 (R^2 >.50). Only in the case of S1_ProdC (EGB Conserving) does the latent variable concerned (EGB) not explain a large amount of variance (<.50) in the composite indicator. This, in conjunction with previous flags raised regarding Conserving (S1_ProdC), was interpreted to mean that this particular composite indicator provided a somewhat less than satisfactory reflection of the latent variable it was earmarked to reflect (EGB) but not to such a degree that it had to be discarded.

It was therefore still concluded that all of the composite indicators provided sufficiently valid representations of the underlying latent variables that they were designed and intended to reflect.

Table 5.44.

Squared multiple correlations for X - variables

S2_Prod1	**S2_Prod2**	**PBC_P1**	**PBC_P2**	**GATT_P1**	**GATT_P2**	**S5_Prod1**
0.7155	0.7657	0.9751	0.7292	0.9628	0.8261	0.6717
S5_Prod2	**GSN_P1**	**GSN_P2**	**S7_Prod1**	**S7_Prod2**	**S8_Prod1**	**S8_Prod2**
0.8122	0.6772	0.6560	0.9418	0.9535	0.8072	0.6190
S9_Prod1	**S9_Prod2**	**S1_ProdT**	**S1_ProdW**	**S1_ProdC**	**S1_ProdI**	**S1_ProdA**
0.7333	0.8830	0.5078	0.5338	**0.3417**	0.7199	0.5678

5.7.6. Integrative Verdict on the Success of the Operationalisation of the Latent Variables Comprising the EGB structural model

In this section, the measurement model was fitted with item parcels as composite indicators. This is because the focus of the analysis is on evaluating the measurement used to operationalise the EGB structural model. The success of the operationalisation of the latent variables was tested. Although the model did not show exact fit, the close fit null hypothesis was not rejected, indicating that the measurement model fits the data closely. This supports the premise that Y provides a construct valid and reliable measure of η, and that X provides a construct valid measure of ξ..

Although one composite indicator did raise concern to be potentially flagged, the evidence was not substantial enough to identify any composite indicators as sufficiently problematic to remove them. All the factor loadings (lambda) were statistically significant ($p<.05$) and the majority were reasonably large. The majority of error variances (theta-delta) were small and also significant ($p<.05$). It was found that all of the indicators provided valid explanations of the underlying latent variables that they were designed and intended to reflect. In summary, based on the basket of evidence from the CFA findings, it can be concluded that the information is sufficient to continue to test and evaluate the EGB structural model.

5.8. EVALUATING STRUCTURAL MODEL FIT

In the previous section, the measurement model was examined so as to investigate the relationships between the observed variables and the latent variables they represent. The generally positive evaluation of the measurement model fit, the statistical significance and magnitude of the factor loadings and measurement error variances and the statistical significance and magnitude of the inter-latent variable correlations warranted the fitting of the comprehensive EGB LISREL model. The structural model forms one part of the comprehensive EGB LISREL model and reflects the structural relationships that were hypothesized to exist between the latent variables. This section evaluates the EGB structural model fit, by assessing the overall goodness-of-fit of the comprehensive LISREL model via the array of fit statistics provided by LISREL 8.8, the percentage large standardised comprehensive model variance-covariance residuals and the percentage large (or statistically significant ($p<.01$)) modification indices (for gamma and beta). If at least reasonable comprehensive LISREL model fit had been attained, given that the measurement model part of the comprehensive LISREL model obtained close fit, the inference was made that the structural model displayed reasonable fit. The inference of at least reasonable structural model fit then warranted the interpretation of the parameter estimates.

When first fitting the proposed EGB structural model, it failed to converge. As such, the outcomes thereof could not be interpreted or trusted. LISREL issued warning messages and one of the problems was that one of the indicators had an inadmissible negative error variance estimate. PBC (prod1) already seemed problematic in the measurement model (as it had statistically insignificant theta-delta estimate). The treatment was to remove this indicator in the comprehensive LISREL model, as it had a negative error variance. The revised comprehensive model was subsequently fitted again.

The revised model still had problems and returned yet again an inadmissible solution, this time with a negative structural error variance estimate for the IAG endogenous latent variable and a R^2 for the IAG latent variable that was larger than 1. Hence, due to the inadmissible value of psi, it was decided to revise the structural model by removing the path between PBC and IAG. This prevented Hypothesis 4 (H_{04}: $\gamma_{71} = 0$) from being tested in the revised model. The revised comprehensive model was subsequently fitted again. This time the model converged with an admissible solution.

Satisfactory model fit was determined by testing the statistical null hypotheses for exact (H_{01a}) and close (H_{01b}) model fit for the comprehensive LISREL model. LISREL was used to test these two overarching structural model fit hypotheses. The statistical null hypotheses for exact and close model fit for the structural model follow.

Exact fit null hypothesis:

H_{01a}: RMSEA = 0
H_{a1a}: RMSEA > 0

Close fit null hypothesis:

H_{01b}: RMSEA ≤ .05
H_{a1b}: RMSEA > .05

The full array of fit indices produced by LISREL 8.8 for the revised comprehensive LISREL model are shown in Table 5.45.

Table 5.45.

The goodness of fit statistics for the revised EGB structural model

Goodness of Fit Statistics
Degrees of Freedom = 154
Minimum Fit Function Chi-Square = 374.0183 (P = 0.0)
Normal Theory Weighted Least Squares Chi-Square = 357.4452 (P = 0.0)
Satorra-Bentler Scaled Chi-Square = 343.4790 (P = 0.00)
Chi-Square Corrected for Non-Normality = 760.9248 (P = 0.0)

Table 5.45.

The goodness of fit statistics for the revised EGB structural model (continued)

Estimated Non-centrality Parameter (NCP) = 189.4790
90 Percent Confidence Interval for NCP = (139.6003 ; 247.0910)

Minimum Fit Function Value = 1.7001
Population Discrepancy Function Value (F0) = 0.8613
90 Percent Confidence Interval for F0 = (0.6345 ; 1.1231)
Root Mean Square Error of Approximation (RMSEA) = 0.07478
90 Percent Confidence Interval for RMSEA = (0.06419 ; 0.08540)
P-Value for Test of Close Fit (RMSEA < 0.05) = 0.0001087

Expected Cross-Validation Index (ECVI) = 2.0704
90 Percent Confidence Interval for ECVI = (1.8436 ; 2.3322)
ECVI for Saturated Model = 1.9091
ECVI for Independence Model = 29.4780

Chi-Square for Independence Model with 190 Degrees of Freedom = 6445.1579
Independence AIC = 6485.1579
Model AIC = 455.4790
Saturated AIC = 420.0000
Independence CAIC = 6573.1211
Model CAIC = 701.7761
Saturated CAIC = 1343.6142

Normed Fit Index (NFI) = 0.9467
Non-Normed Fit Index (NNFI) = 0.9626
Parsimony Normed Fit Index (PNFI) = 0.7673
Comparative Fit Index (CFI) = 0.9697
Incremental Fit Index (IFI) = 0.9699
Relative Fit Index (RFI) = 0.9342

Critical N (CN) = 127.6547

Root Mean Square Residual (RMR) = 21.7774
Standardized RMR = 0.09396
Goodness of Fit Index (GFI) = 0.8602
Adjusted Goodness of Fit Index (AGFI) = 0.8094
Parsimony Goodness of Fit Index (PGFI) = 0.6308

The LISREL Goodness of fit statistics output, shown in Table 5.45, indicates that the Satorra-Bentler scaled chi-square statistic was statistically significant ($p<.05$). This meant that the exact fit null hypothesis (H01a) had to be rejected and that the structural model did not fit exactly.

The fit statistics also indicate that the close fit null hypothesis (H01b) had to be rejected. The probability of observing the sample RMSEA estimate (.07478) under the close fit null hypothesis was sufficiently small ($p<.05$) to reject the assumption made by the close fit null hypothesis about the parametric RMSEA value. The fact that the close fit null hypothesis was

rejected was acknowledged as a methodological limitation. It was however still argued that although the model does not fit exact or close, the model still fitted the data in the sample reasonably well (RMSEA value= .07478). Moreover, the Preacher and Coffman software developed in R (Preacher & Coffman, 2006) indicated that the statistical power of the close fit null hypothesis test under Ha: RMSEA=.070 was quite high (.892192). In other words, if the comprehensive model would fit reasonably in the parameter (RMSEA=.070) the probability of rejecting the close fit null hypothesis was almost a certainty. The statistical power of testing the reasonable fit null hypothesis (RMSEA=.06) assuming an effect size of RMSEA=.07 was (.4403546). The likelihood of rejecting the reasonable fit null hypothesis was therefore sufficiently small to bolster confidence in the position of reasonable model fit in the parameter. The normed fit index (.9467) and the comparative fit index (.9697) both indicated good model fit. The standardised root mean residual (.0939) in contrast again suggested a reasonable to mediocre fitting model. Hence, given this basket of fit index considerations, it was decided to interpret the fit of the comprehensive model as reasonable, approaching mediocrity. The completely standardised solution of the fitted reduced comprehensive EGB LISREL model is shown in Figure 5.16.

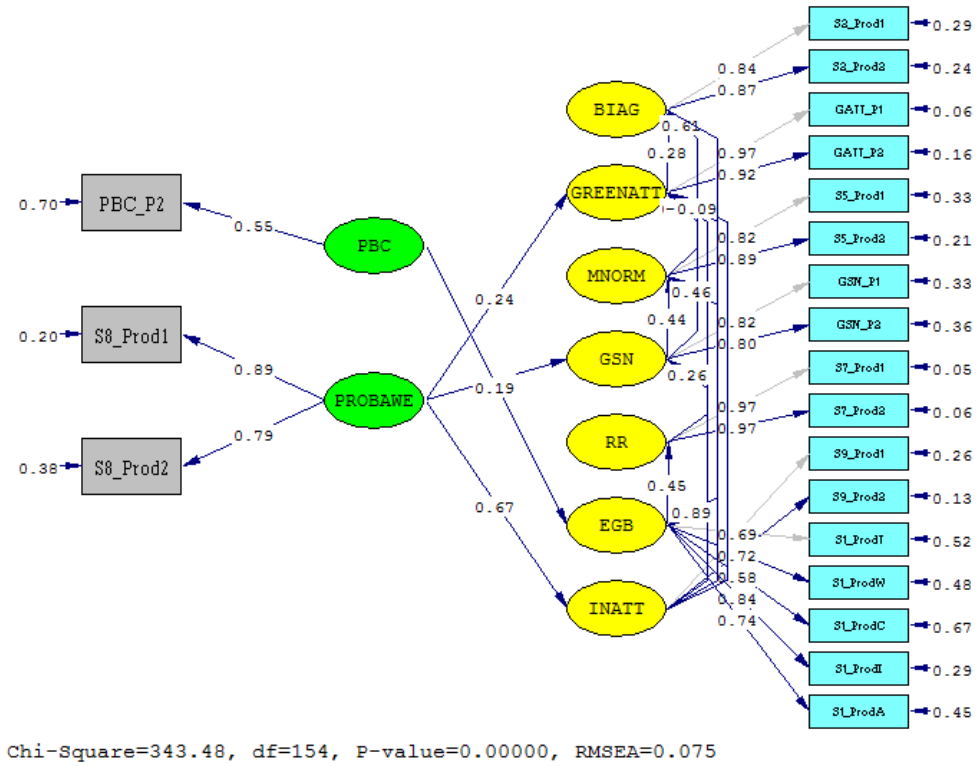


Figure 5.16. ***Representation of the fitted EGB structural model (completely standardised solution)***

The evaluation of comprehensive LISREL model fit from the perspective of the fit statistics suggested reasonable model fit approaching mediocrity. An evaluation of comprehensive LISREL model fit through an assessment of the percentage of large standardised

comprehensive LISREL model variance-covariance residuals and the percentage of statistically significant (p<.05) modification indices (for gamma and beta), were as follow.

5.8.1. Examining the Structural Model Residuals

The standardised residuals were interpreted to assess the comprehensive model fit. Standardised residuals are considered large when they are larger than 2.58 or -2.58. The LISREL output in Table 5.46. indicates that there were 29 large positive standardised residuals in the model. As such, 12.55% (29/[(21* 21+1)/2]= 29/231=.12554) of the standardised residuals is large, indicating that the fitted model underestimated the observed variances and covariances and therefore that the model lacked paths. The 29% large standardised residuals suggested reasonable model fit.

Table 5.46.

Summary statistics for the standardised residuals

Residual	Value
Summary Statistics for Standardized Residuals	
Smallest Standardized Residual	-2.0848
Median Standardized Residual	0.5924
Largest Standardized Residual	19.7427
Largest Positive Standardized Residuals	
Residual for S7_Prod1 and GATT_P1	2.7334
Residual for S7_Prod1 and GSN_P1	3.6626
Residual for S7_Prod1 and GSN_P2	3.3872
Residual for S7_Prod2 and GSN_P1	4.0320
Residual for S7_Prod2 and GSN_P2	3.3915
Residual for S1_ProdT and S5_Prod2	3.1343
Residual for S1_ProdC and S2_Prod1	3.1442
Residual for S1_ProdC and GATT_P1	3.0376
Residual for S1_ProdC and GATT_P2	2.8051
Residual for S1_ProdI and S2_Prod2	19.7427
Residual for S1_ProdI and S1_ProdC	6.6202
Residual for S1_ProdA and S2_Prod1	5.1251
Residual for PBC_P2 and S2_Prod1	4.1492
Residual for PBC_P2 and S2_Prod2	4.2087
Residual for PBC_P2 and GATT_P1	3.4498
Residual for PBC_P2 and GATT_P2	2.6860
Residual for PBC_P2 and S5_Prod1	2.6553
Residual for PBC_P2 and S5_Prod2	3.5498
Residual for PBC_P2 and GSN_P1	3.0999
Residual for PBC_P2 and GSN_P2	4.9840
Residual for PBC_P2 and S7_Prod1	4.3809
Residual for PBC_P2 and S7_Prod2	4.5617
Residual for PBC_P2 and S9_Prod1	2.5935
Residual for PBC_P2 and S1_ProdT	4.5774
Residual for PBC_P2 and S1_ProdW	3.2406
Residual for PBC_P2 and S1_ProdI	3.3710
Residual for PBC_P2 and S1_ProdA	3.8060
Residual for S8_Prod1 and S5_Prod2	2.9984
Residual for S8_Prod2 and S2_Prod2	2.6520

5.8.2. Examining the Structural Model Modification Indices

The modification indices were calculated by LISREL for the $\mathbf{B}$, Γ and Ψ matrices (see Table 5.47, Table 5.48 and Table 5.49). These were examined to determine the percentage of statistically significant (p<.01) modification indices that point to suggested paths that will significantly improve the fit of the model. Modification indices that are large (≥6.64) suggest paths that if they are inserted will improve the model fit.

Table 5.47.

Modification indices for B

	IAG	GREENATT	MNORM	GSN	RR	EGB	INATT
IAG	- -	- -	- -	0.3813	4.3361	0.2311	2.8774
GREENATT	2.8816	- -	**21.2698****	- -	- -	- -	- -
MNORM	0.0980	**27.9102****	- -	- -	1.4800	0.0337	- -
GSN	- -	- -	- -	- -	**30.5291****	- -	- -
RR	- -	6.0551	0.4093	**18.6792****	- -	- -	0.9033
EGB	- -	1.4403	**101.5437****	2.3971	0.1238	- -	4.5715
INATT	1.0912	0.0021	6.1344	- -	0.9113	0.0002	- -

** (p<.01)
INATT= Internal Attribution
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
EGB= Employee Green Behaviour
IAG= Intention to Act Green

Table 5.48.

Modification indices for Γ

	PBC	PROBAWE
IAG	**8.6902*8**	3.6714
GREENATT	2.8944	- -
MNORM	5.2079	**13.3830****
GSN	**29.0352****	- -
RR	5.5601	6.3942
EGB	- -	- -
INATT	5.9237	- -

** (p<.01)
INATT= Internal Attribution
PBC= Perceived Behavioural Control
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
PROBAWE= Problem Awareness
EGB= Employee Green Behaviour
IAG= Intention to Act Green

Five statistically significant modification index values were obtained for the beta matrix. This constituted only 16.13% (5/[(7*2)-11] = 5/31 = .16129) of the currently fixed elements of **B**. Three statistically significant modification index values were obtained for the gamma matrix.

This constituted 33.13% (3/[(7*2)-5] = 3/9 = .333333) of the currently fixed elements of Γ. Three statistically significant modification index values were obtained for the psi matrix. This constituted only 14.29% (3/[(7*6)/2] = 3/21 = .142857) of the currently fixed elements of Ψ. Collectively these three percentages reasonable model fit approaching mediocrity.

Table 5.49.

Modification indices for Psi

** (p<.01)

	IAG	GREENATT	MNORM	GSN	RR	EGB	INATT
IAG	- -						
GREENATT	4.9706	- -					
MNORM	4.7011	**10.7454****	- -				
GSN	0.0576	- -	- -	- -			
RR	5.0727	- -	1.9045	**22.5128****	- -		
EGB	0.3387	5.4570	0.0201	1.0602	0.1197	- -	
INATT	0.2385	- -	**13.2294****	- -	1.1043	1.5690	- -

** (p<.01)
INATT= Internal Attribution
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
EGB= Employee Green Behaviour
IAG= Intention to Act Green

5.8.3. Integrative Verdict on the Comprehensive LISREL model fit

Integration of the results for the fit statistics, standardised residuals and model modification indices suggested reasonable model fit approaching mediocrity. The researchers regarded the comprehensive LISREL model fit findings sufficiently reasonable to still interpret the structural model parameter estimates. This entailed the testing of the specific gamma and beta path coefficient null hypotheses listed in Table 3.1 (see Chapter 3).

5.9. EXAMINING THE STRUCTURAL MODEL PARAMETER ESTIMATES

The finding of reasonable comprehensive LISREL model fit, taken in conjunction with close measurement model fit warranted the interpretation of the structural model parameter estimates. As such, the specific gamma and beta path coefficient hypotheses listed in Table 3.1 are tested. To interpret the significance of the betas and gammas, the unstandardised matrices were examined (Table 5.50. and Table 5.51

Table 5.50.
Unstandardised Beta matrix

	INATT	GREENATT	MNORM	GSN	RR	EGB	IAG
INATT	- -	- -	- -	- -	- -	- -	- -
GREENATT	0.0946 (0.1059) **0.8940**	- -	- -	0.5546* (0.0890) 6.2332	0.0164 (0.0726) **0.2255**	-0.1782 (0.1418) **-1.2567**	- -
MNORM	0.4623* (0.0769) 6.0150	- -	- -	0.4377* (0.0894) 4.8972	- -	- -	- -
GSN	0.2637* (0.1174) 2.2464	- -	- -	- -	- -	- -	- -
RR	- -	- -	- -	- -	- -	0.4474* (0.0790) 5.6618	- -
EGB	- -	- -	- -	- -	- -	- -	0.8867* (0.0950) 9.3349
IAG	- -	0.2779* (0.1073) 2.5908	0.6065* (0.0785) 7.7221	- -	- -	- -	- -

* (p<.05)
INATT= Internal Attribution
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
EGB= Employee Green Behaviour
IAG= Intention to Act Green

Table 5.51.
Unstandardised Gamma matrix

	PBC	PROBAWE
INATT	- -	0.6700* (0.0709) 9.4520
GREENATT	- -	0.2446* (0.1017) 2.4060
MNORM	- -	- -
GSN	- -	0.0950 (0.1345) **0.7058**
RR	- -	- -
EGB	0.1867 (0.1323) **1.4118**	- -
IAG	- -	- -

* (p<.05)
INATT= Internal Attribution
PBC= Perceived Behavioural Control
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
PROBAWE= Problem Awareness
EGB= Employee Green Behaviour
IAG= Intention to Act Green

All of the signs associated with the significant γ parameter estimates were consistent with the nature of the hypothesised relationship between the two latent variables. All of the signs associated with the significant β parameter estimates were consistent with the nature of the hypothesised relationship between the two latent variables, except for H_{a17}. The LISREL output indicates that the path between EGB and Green Attitude is negative (β_{26}).

The statistical significance ($p<.05$) of both the β and γ parameter estimates were investigated to determine if the path coefficient null hypotheses had to be rejected or not. The LISREL output confirmed that 10 of the 15 null hypotheses that were tested in the comprehensive LISREL model that was eventually fitted could be rejected ($p<.05$). Although β_{26} was statistically significant ($p<.05$) H_{017} could not be rejected because the sign of the β_{26} estimate disagreed with the sign anticipated under H_{a17}. Moreover, the path between PBC and IAG was removed because of the inadmissible psi estimate associated with IAG. Hence Hypothesis 4 (H_{04}: $\gamma_{71} = 0$) was not tested in the revised model. The following null hypotheses were rejected:

- Hypothesis 2: H_{02}: $\beta_{67} = 0$
- Hypothesis 5: H_{05}: $\beta_{72} = 0$
- Hypothesis 6: H_{06}: $\beta_{73} = 0$
- Hypothesis 7: H_{07}: $\beta_{24} = 0$
- Hypothesis 8: H_{08}: $\beta_{34} = 0$
- Hypothesis 9: H_{09}: $\gamma_{22} = 0$
- Hypothesis 10: H_{010}: $\gamma_{12} = 0$
- Hypothesis 12: H_{012}: $\beta_{41} = 0$
- Hypothesis 13: H_{013}: $\beta_{31} = 0$
- Hypothesis 15: H_{015}: $\beta_{56} = 0$

Support was therefore obtained for the following hypotheses:

- **Hypothesis 2:** In the proposed EGB structural model it is hypothesised that IAG will positively affect EGB[34].
- **Hypothesis 5:** In the proposed EGB structural model it is hypothesised that Green Attitude will positively influence IAG.

[34] The phrase *in the proposed EGB structural model it is hypothesised that* was used on purpose to acknowledge that each hypothesis claims that a specific exogenous latent variable (ξi) or endogenous latent variable (η_i) influences a specific endogenous latent variables (η_j) when controlling for the other latent variables that are structurally linked to η_j.

- **Hypothesis 6:** In the proposed EGB structural model it is hypothesised that Moral Norm will positively influence IAG.
- **Hypothesis 7:** In the proposed EGB structural model it is hypothesised that GSN will positively influence Green Attitude.
- **Hypothesis 8:** In the proposed EGB structural model it is hypothesised that GSN will positively influence Moral Norm.
- **Hypothesis 9**: In the proposed EGB structural model it is hypothesised that Problem Awareness will positively affect Green Attitude.
- **Hypothesis 10:** In the proposed EGB structural model it is hypothesised that Problem Awareness positively influences Internal Attribution
- **Hypothesis 12:** In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence GSN.
- **Hypothesis 13:** In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Moral Norm.
- **Hypothesis 15:** In the proposed EGB structural model it is hypothesised that EGB will positively influence Rewards and Recognition.

There were four parameter estimates that were statistically insignificant ($p>.05$) and where the null hypotheses could not be rejected and one parameter estimate, that although statistically significant ($p<.05$) disagreed with the prophecy made under Ha and consequently the null hypothesis could also not be rejected:

- **Hypothesis 3:** H_{03}: $\gamma_{61} = 0$
- **Hypothesis 11:** H_{011}: $\gamma_{42} = 0$
- **Hypothesis 14:** H_{014}: $\beta_{21} = 0$
- **Hypothesis 16:** H_{016}: $\beta_{25} = 0$
- **Hypothesis 17:** H_{017}: $\beta_{26} = 0$

Thus, support is not found for the hypothesised effect of PBC on EGB; Problem Awareness on GSN; Internal Attribution on Green Attitude; Rewards and Recognition on Green Attitude; and for EGB on Green Attitude. Support was therefore not obtained for the following hypotheses:

- **Hypothesis 3:** In the proposed EGB structural model it is hypothesised that PBC will positively affect EGB.
- **Hypothesis 11:** In the proposed EGB structural model it is hypothesised that Problem Awareness will positively influence GSN.

- **Hypothesis 14:** In the proposed EGB structural model it is hypothesised that Internal Attribution will positively influence Green Attitude.
- **Hypothesis 16:** In the proposed EGB structural model it is hypothesised that Rewards and Recognition will positively affect Green Attitude.
- **Hypothesis 17:** In the proposed EGB structural model it is hypothesised that EGB will positively affect Green Attitude.

In summary, most of the estimated path coefficient were statistically significant (p<.05), supporting the claim that there are relationships between the latent variables in the model.

The psi matrix in Table 5.52. depicts the variances in the structural error terms. The LISREL output indicates that all of the psi values are statistically significant (p<.05). One would expect the psi variances to be small but significant, since one would not regard the model as perfect /complete.

Table 5.52.

Unstandardised Psi matrix

INATT	GREENATT	MNORM	GSN	RR	EGB	IAG
0.5510*	0.6419*	0.4622*	0.8879*	0.7970*	0.1643*	0.4652*
(0.0821)	(0.0961)	(0.0787)	(0.1517)	(0.0858)	(0.0770)	(0.0790)
6.7095	6.6809	5.8696	5.8530	9.2942	2.1333	5.8877

* (p<.05)
INATT= Internal Attribution
GREENATT= Green Attitude
MNORM= Moral Norma
GSN= Green Social Norm
RR= Rewards and Recognition
EGB= Employee Green Behaviour
IAG= Intention to Act Green

Squared Multiple Correlations for η variables indicate the proportion of variance that the structural model explained in each of the seven endogenous latent variables. Small R^2 values would indicate areas in the model that need extension/elaboration. Table 4.53 indicates that most of the R^2 values are reasonably large, which shows that the model explains more than 50% of variance in some of the latent variables. The fact that the model explained more than 50% of the variance in IAG and EGB as the two focal latent variables in the model is especially gratifying. In the case of the EGB latent variable the percentage of variance explained is possibly a bit too high. One would not expect a first-generation explanatory model to be this successful in explaining variance in any latent variable. The model also explained variance in MNORM quite well. The model reasonably successfully accounted for the variance in INATT and GREENATT. Yet, some of the R^2 values are small, suggesting that the proportion of

variance that the structural model explains in each of these endogenous latent variables (GSN and RR) is rather small.

Table 5.53.

Squared multiple correlations for endogenous latent variables

INATT	GREENATT	MNORM	GSN	RR	EGB	IAG
0.4490	0.3581	0.5378	0.1121	0.2030	0.8357	0.5348

Lastly, the magnitude of the completely standardised statistically significant (p<.05) betas and gammas shown in Table 5.54 and Table 5.55 were interpreted as the average standard deviation change in η associated with one standard deviation change on the ξ or η.

Table 5.54.

Completely standardised B

	INATT	GREENATT	MNORM	GSN	RR	EGB	IAG
INATT	- -	- -	- -	- -	- -	- -	- -
GREENATT	0.0946	- -	- -	0.5546	0.0164	-0.1782	- -
MNORM	0.4623	- -	- -	0.4377	- -	- -	- -
GSN	0.2637	- -	- -	- -	- -	- -	- -
RR	- -	- -	- -	- -	- -	0.4474	- -
EGB	- -	- -	- -	- -	- -	- -	0.8867
IAG	- -	0.2779	0.6065	- -	- -	- -	- -

Table 5.55.

Completely standardised Γ

	PBC	PROBAWE
	---	---
INATT	- -	0.6700
GREENATT	- -	0.2446
MNORM	- -	- -
GSN	- -	0.0950
RR	- -	- -
EGB	0.1867	- -
IAG	- -	- -

Table 5.54 indicates that PROBAWE exerted a reasonably pronounced effect on INATT, that MNORM exerted a reasonably pronounced effect on IAG and that the effect of GSN on GREENATT was moderate whilst GSN and INATT had modest effects on MNORM.

5.10. SUMMARY

The purpose of this chapter was to report of the findings of the study. This chapter started by discussing the item analysis, which was executed to determine the psychometric integrity of

the indicator variables meant to represent the various latent dimensions. The purpose of item analysis was to determine the internal consistency of the responses to the items of the various scales and subscales comprising the composite research questionnaire. Item analysis had been done on each subscale used to measure the latent variables in the proposed EGB structural model separately. It should be noted that GSN's, PBC's, and Green Attitude's two scales respectively were not item analysed. The item analysis suggested that some of the items were marginally problematic. But it was argued that the evidence was not strong enough to remove these items. Hence, based on the item analysis results, no poor items were detected.

Thereafter, dimensionality analysis, through EFA, was performed on each of the selected subscales. This was followed by an evaluation of the extent to which the data satisfied the statistical data assumptions relevant to the data analysis techniques utilised in this study. The measurement model was fitted, and close fit was found. This permitted the testing of the structural model.

The structural model parameter estimates indicated that support was not found for the hypothesised effect of PBC on EGB; Problem Awareness on GSN; Internal Attribution on Green Attitude; Rewards and Recognition on Green Attitude; and for EGB on Green Attitude. Hence, there does not seem to be statistically significant relationship between these latent variables. In summary, most of the estimated path coefficient were, however, statistically significant ($p<.05$), supporting the claim that there are relationships between the latent variables as hypothesised in the EGB structural model. Chapter 6 will discuss the conclusions drawn based on the results obtained in the study.

CHAPTER 6
CONCLUSIONS AND RECOMMENDATIONS

"There is a sufficiency in the world for man's need but not for man's greed."
-Mohandas Karamchand Gandhi

6.1. INTRODUCTION

The research-initiating question of this study posed the question why there is variance in EGB amongst employees[35]. The research objective was to develop and empirically test an explanatory EGB structural model that would provide a valid answer to this research-initiating question. Chapter 1 presented a logical argument to motivate the importance of researching EGB. Chapter 2 made use of theorising rooted in previous research in the field to "uncover" the complex nomological network underlying EGB. The theorising led to a proposed EGB structural model. The methodology employed to test the validity of the proposed EGB structural model was discussed in Chapter 3. Valid conclusions on the validity of the psychological mechanism hypothesised to regulate the levels of EGB that employees display is dependent on the objectivity and rationality of the proposed research methodology. To allow the latter, the former was extensively described and argued. The chapter on methodology indicated that the proposed EGB structural model would be tested through an *ex post facto* correlation design with SEM to fit the model. Finally, in Chapter 5 the research results with regards to the statistical hypotheses of the proposed EGB measurement and structural model were discussed.

6.2. CONCLUSION AND DISCUSSION

Given the research results, recommendations as to how future research studies can take this study further will be discussed. Practical recommendation will also be made to indicate how organisations and managers can enhance and motivate EGB.

Most of the estimated path coefficient in the EGB model were found to be statistically significant ($p<.05$), supporting the claim that there are relationships between these latent variables in the model. Nevertheless, support was not found for the hypothesised effect of PBC on EGB; Problem Awareness on GSN; Internal Attribution on Green Attitude; Rewards and Recognition on Green Attitude; and for EGB on Green Attitude.

The current study failed to obtain support for the path-specific hypotheses that Perceived Behavioural Control affects EGB directly. Bamberg and Möser's (2007) model did not include the direct path between PBC and PEB. The current study added this hypothesis in agreement

[35] The question should be interpreted to imply the question which psychological mechanism produced variance in employees IAG?

with the general Theory of Planned behaviour (Ajzen, 1991). Klöckner (2013) also argued that Perceived Behavioural Control can, under certain conditions, have a direct impact on behaviour. In his meta-analysis of general environmental behaviour, support was obtained for this path although its influence was found to be weaker than that of Intention to Act Green. No readily apparent flaw in the theorising underpinning this hypothesised path could be detected.

The current study failed to corroborate the path-specific hypotheses that Problem Awareness affects Green Social Norm. Problem Awareness refers to an individual's awareness of and knowledge about environmental issues and the negative consequences of harmful environmental behaviour. It was argued that Problem Awareness should also influence Social Norm, as a stronger awareness and broader knowledge of environmental problems will contribute to the GSN through its impact on the motivation to comply (Mc_j) with the green expectations of others. This structural path was also proposed by Bamberg and Möser (2007), as well as Lülfs and Hahn (2013). No readily apparent flaw in the theorising underpinning this hypothesised path could be detected.

Moreover, the current study failed to corroborate the path-specific hypotheses that Internal Attribution positively influences Green Attitude. Bamberg and Möser's (2007) model also hypotheses that Internal Attribution directly influences Green Attitude. This reasoning is still regarded as plausible as the extent to which employees internally attribute responsibility for environmental behaviour could influence their attitude towards EGB by driving the evaluation (e_i) of negative outcomes more negative, and positive outcomes more positive. A second reflection on the theorising underpinning this hypothesised path did not point to any readily apparent flaw in the original theorising.

In addition, the current study also failed to corroborate the path-specific hypotheses that Problem Awareness affects Green Social Norm. As previously mentioned with regards to Vroom's expectancy theory, valence (or evaluation in the TRA) refers to individuals' evaluation of the value and desirability that they attach to EGB. Expectation (or belief in the TRA) in turn refers to the belief that individuals hold that their attempt to display EGB will meet with success. Instrumentality refers to the subjective probability that EGB will lead to the salient outcomes. The valence of EGB depends on the valence of the outcomes multiplicatively combined with the instrumentality of EGB in achieving these outcomes. Successful attainment of rewards offered for EGB should strengthen the valence associated with the EGB. Rewards and Recognition can therefore be hypothesised to feedback onto Green Attitude (i.e. influence their attitude towards green behaviour) via its effect on the Val [EGB].

The current study failed to obtain support for the path-specific hypotheses that Rewards and Recognition positively influences Green Attitude. In the original theorising it was argued in

terms of Vroom's expectancy theory, that valence (or evaluation in the TRA) refers to individuals' evaluation of the value and desirability that they attach to EGB. Expectation (or belief in the TRA) in turn refers to the belief that individuals hold that their attempt to display EGB will meet with success. Instrumentality refers to the subjective probability that EGB will lead to the salient outcomes. The valence of EGB depends on the valence of the outcomes multiplicatively combined with the instrumentality of EGB in achieving these outcomes. Successful attainment of rewards offered for EGB should strengthen the valence associated with the EGB. Rewards and Recognition can therefore be hypothesised to feedback onto Green Attitude (i.e. influence their attitude towards green behaviour) via its effect on the Val [EGB]. A second reflection on the theorising underpinning this hypothesised path did nor point to any readily apparent flaw in the original theorising.

Furthermore, the current study failed to obtain support for the path-specific hypotheses that EGB positively feeds back on to Green Attitude In the original theorising it was argued that employees' experience of past behaviour in addition can influence the attitude that they form towards this behaviour (Ajzen, 1991; Tonglet *et al*., 2004; Lacasse, 2016) via its positive influence on the expectancies or beliefs (b_i). Hence, it is hypothesised that EGB will feedback to positively influence employees' Green Attitude (Govindarajulu & Daily, 2004, p. 369). A second reflection on the theorising underpinning this hypothesised path did nor point to any readily apparent flaw in the original theorising.

6.3. RECOMMENDATIONS FOR FUTURE RESEARCH

The first recommendation would be that the model be empirically tested on a more representative sample. If this ideal is achieved, it could contribute to/result in a higher degree of generalisability of the results. Other data driven and theory driven recommendations for future research studies will be discussed below.

6.3.1. Data-driven Recommendations for Future Research

The modification indices for the gamma and beta matrices were evaluated to see if the LISREL output made any suggestions to change the model to improve its fit. After examining the beta and gamma matrices (Table 5.47. and Table 5.48.), the parameter with the highest modification index was β_{63}. This represents a path from Moral Norm to EGB. After some reflection, it was concluded that this path made sufficient substantive theoretical sense to be included as a possible modification to the model. The fitted model made provision for an indirect effect of Moral Norm on EGB through Intention to Act Green (IAG) as a mediating variable. The significant modification index value obtained for β_{63} suggests a direct effect of Moral Norm on EGB. Moral Norm refers to employee's self-evaluation and self-perception of the moral correctness of a certain behaviour (Tonglet, Phillips & Read, 2004). Green Moral

Norm therefore has an internal locus. The current study interpreted Moral Norm as conceptually equivalent to the personal norm construct. According to Ruepert *et al.* (2016, p. 60), "personal norms reflect self-expectations and are experienced as feelings of moral obligation to engage in the relevant behaviour." In as far as Moral Norm is a self-imposed expectation it essentially acts like a behavioural intention. Hence the current study argues that the suggested direct path from Green Moral Norm to EGB makes substantive theoretical sense, as it has been measured in this study.

The parameter with the second highest[36] modification index was β_{35}. This represents a path from Rewards and Recognition (RR) to GSN. This path also made substantive theoretical sense. The actions that organisations formally reward and recognise communicate to employees what the organisation and its representatives (the superior of the employee for example) expect from employees. To the extent that organisations reward specific forms of EGB should therefore positively impact on the Normative Belief (Nb_i) that the organisation and its leaders expect employees to act green and via that on the strength of the Green Social Norm. It could moreover be argued that through the effect posited above Rewards and Recognition (RR) should also affect the Nb_i of employees regarding co-workers expectations.

The proposed path from Green Attitude (GREENATT) to Green Moral Norm (MNORM), and the proposed path from Perceived Behavioural Control (PBC) to Intention to Act Green (IAG) also made substantive theoretical sense. The latter path is in accordance with the tenants of the Theory of Planned behaviour put forward by Ajzen (1991, 2002).

Attitude refers to individuals' positive or negative evaluation of behaviour (Ajzen, 1991). The current study defined Green Attitude as an employee's attitude towards EGB. Green Attitude is the multiplicative combination of outcome evaluations (e_i) and behavioural beliefs (b_i) that EGB will result in salient outcomes, summed over the salient outcomes. It seems reasonable to argue that a positive attitude towards EGB (i.e. a positive evaluation of EGB because of the perceived valence of the likely salient outcomes) should over time result in the development of self-imposed expectations to act green. The argument here is similar to the argument put forward in defence of the hypothesis that Green Social Norm (GSN) affects Green Moral Norm (MNORM). Support was obtained for the latter hypothesis. The point previously raised under comment 28 should, however also be kept in mind here.

[36] It is acknowledged that the modification index values reported in Table 5.47 reflect the improvement in model fit (as reflected by the normal theory chi-square statistic) when a path fixed to zero would be freed. Doing so for the path with the highest modification index value that made substantive theoretical sense would then alter the modification index values for the remaining currently fixed paths. Interpreting the paths flagged by the modification index values in this cumulative manner is therefore dangerous and strictly speaking inappropriate.

The current study did not consider any of the other paths suggested by the modification indices calculated for Γ and $\mathbf{B}$ to make sufficient substantive theoretical sense to be flagged here for consideration for future research.

The proposed relationship between Moral Norm and EGB was assessed by revising the model. When analysing the fit of this newly revised model that included this path, the RMSEA slightly decreased from .07478 to .07352. Hence, this suggests that when this path is freed, the fit of the EGB model somewhat improved. The path between these two latent variables was not statistically significant (p>.05) and the implied null hypothesis could not be rejected. However, all of the other hypothesised paths that were found to be statistically significant, remained significant. Adding this path slightly improved the strength of the relationship between certain latent variables, but it also decreased the strength of others in the model. This finding detracts from the reasonably persuasive theoretical argument arguing in favour of adding this path to a future EGB structural model.

The parameter with the second highest modification index was β_{53}. This represents a path from Rewards and Recognition to GSN. This path also makes substantive theoretical sense. Rewarding EGB and recognising EGB communicates to employees that management values and expects EGB. It should therefore impact on the normative belief component of GSN.

6.3.2. Theory-driven Recommendations for Future Research

It is with great regret and sorrow that the initially proposed EGB structural model (Figure 2.2.) had to be reduced (Figure 3.1.) due to practical considerations. There is a concern that the revised EGB structural model fails to fully recognise and grasp the complexity of EGB. Thus, there is an urge/desire to encourage future researchers to investigate and empirically test the comprehensive EGB structural model (Figure 2.2.) with all of its hypothesised paths derived from the literature review in Chapter 2.

Given that at least reasonable model fit had been achieved, it is recommended that future research attempts to elaborate the proposed EGB structural model by considering various additional latent variables and paths for inclusion. Thus, future research should incorporate additional latent variables to the EGB structural model. These should firstly include those that had been included in the initial structural model that emerged from the theorising but that were excluded from the model that was empirically tested.

Additional latent variables, not included in the original EGB structural model, should, however, also be considered in future research. Examples of such additional latent variables that could be identified as determinants of OGC, are for example *environmental management systems* (Paille´ *et al*., 2015), *environmental policies* (Ramus, 2002; Norton *et al*., 2014) and *supportive*

supervisory behaviour (Ramus, 2002; Renwick, Redman & Maguire, 2013). Regarding these latent variables, Ramus (2002, p. 160) found that when employees are more aware that their company is committed to their environmental policies, they are more likely to engage in environmental initiatives/EGB. The results also indicate that when supervisors were supportive of environmental actions and behaviours, employees were more likely to engage in eco-initiatives/EGB than when supervisors did not show supportive behaviour (Ramus, 2002, p. 160).

Likewise, future research should further investigate the influence of leadership on EGB (Robertson & Barling, 2013). Paillé and Mejía-Morelos (2014) also hypothesise that *perceived organisational support (POS)* has a mediating/indirect influence on PEB at work, and that it influences job attitudes, which in turn have an effect on PEB. Future research studies should thus investigate how *POS* could be embedded in the proposed EGB structural model and should explore the nature of its relationship with the other latent variables.

Moreover, future research should investigate additional paths between various latent variables. For example, it can be argued that an OGC can influence employees' Green Values. According to Blok *et al*. (2015, p. 7), "environmental values only have a significant positive effect on personal norms and therefore an indirect effect on the intention to act pro-environmentally in the workplace." Hence, the influence of Green Values on IAG, through its effect on Moral Norm as the mediating variable, should also be investigated. From this reasoning, it would seem logical to recommend that future researchers investigate these suggested paths with regards to the overall proposed EGB structural model. Furthermore, the relationship between *specific* Green Attitudes and IAG to predict specific EGBs can be assessed in future studies. According to Lülfs and Hahn (2013, p. 89) "specific attitudes toward the behaviour under study are likely to be a stronger predictor".

6.4. PRACTICAL RECOMMENDATIONS

Given that support was obtained for the model via at least reasonable model fit and statistically significant ($p<.05$) path coefficients, various practical recommendations can be made to improve EGB. Organisations should focus on increasing the level of the identified latent variables in the structural model to improve EGB among employees. The level of the malleable latent variables can be enhanced through stock interventions (Milkovich *et al*., 2008). The level of non-malleable latent variables has to be enhanced through flow interventions (Milkovich *et al*., 2008). In the model that was tested all the latent variables were malleable person characteristics that can be enhanced through human resource interventions aimed at increasing or strengthening the person characteristic in question.

It is recommended that organisations develop and implement workshops with the aim of improving employees' knowledge regarding the severity of the environmental threats facing the planet and the importance of collective green behaviour in the workplace. HR activities should focus on raising awareness of environmental problems among employees, as well as actions that can be taken to eliminate this problem. Organisations should educate employees about EGB, the effect their EGB has on the environment as well as how it fits in/ will contribute to the organisation's overall business strategy. This education can form part of an organisations' general induction program.

Additionally, it is recommended that organisations focus on developing an organisational culture that values eco-initiatives and generally expects all employees to engage in EGB. To create an OGC, organisations should foster pro-environmental values, beliefs, attitudes, practices and assumptions. Organisations should emphasise their own green values in order to establish GSNs in the organisation.

HRM practices are crucial in promoting EGB in the workplace (Zibarras & Coan, 2015). Organisations should thus ensure that the right processes and structures are in place to support and motivate EGB. Furthermore, organisations' reward and recognition policies and procedures should be adapted to recognise and reward employees that engage in EGB. Organisations can even consider taking disciplinary action towards employees that engage in negative EGB/ behaviours that harm the environment.

6.5. LIMITATIONS

It has to be acknowledged that although the model/hypotheses are causal in their reasoning, the results found in this study will not be sufficient to prove this. To take the stance that a change in one variable will cause change in another variable is only possible via an experimental design (through manipulation). As this study makes use of an ex post facto correlation design, the results will not provide conclusive evidence to prove this stance that variables have a causal influence on each other. An ex post facto correlation design will only indicate covariate relationships between variables. Significant paths will not prove that one variable causally influences another, only that there is a correlational relationship.

A further limitation is that the study was conducted in South African companies in a time when the country was experiencing an extreme drought /water crisis (in the Western Cape area specifically). Consequently, there is a possibility that South African citizens had a heightened awareness of green behaviour at the time that the study was done. Hence, this could have increased the probability that employees would agree to participate in the study. It is however debatable whether or not the influence of this on the research results was significant.

For participation in the study, participants could stand a chance to win one of two *Takelot* vouchers to the value of R 1 000 each. If participants completed the questionnaire, they could voluntarily choose to follow a link to another independent electronic questionnaire that required their email address. This was done to enter into a lucky draw to win the prize (vouchers). The winners were randomly selected. This was done in an attempt to attract more participants and hopefully increase the chances of getting complete questionnaires. The study acknowledges that this could be seen as a limitation; as it could have influenced the participants' motivation to complete the questionnaire and consequently influence the quality of the data.

During the data collection process, small changes were made to the questionnaire. One of these was that the estimated time of completing the questionnaire was changed from 30minutes, to 25 minutes. This was done in an attempt to present the request to participate as a more attractive proposition without falsely portraying the time required to complete the questionnaire. This might, however, raise questions about the standardised conditions of data collection. Nonetheless, it is argued that this slight change in estimated time did not significantly impact the data and the study's findings. The data gathering before and after this change was comparable. The hope was that the change impacted the likelihood that employees that were invited to participate in the research would take up the invitation.

Even though the limitations discussed are noteworthy; the researcher is of the opinion that the findings of this study still contribute to a better understanding of EGB as defined in this study.

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APPENDIX A: ETHICAL CLEARANCE APPLICATION FORM

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
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STELLENBOSCH UNIVERSITY
CONSENT TO PARTICIPATE IN RESEARCH

Title of the research proposal: Development and Empirical Testing of an Explanatory Structural Model of Employee Green Behaviour

Consent form addressed to: Organisational employees

Dear prospective participant

My name is Eileen Albertyn, a master's student from the Department of Industrial Psychology at Stellenbosch University, and I would like to invite you to take part in a survey. The results of which will contribute to my master's thesis, in order to complete my master's degree in Industrial Psychology. You were selected as a possible participant in this study because you are currently employed at a South African organisation, and therefor satisfy my sample requirements.

Please take some time to read the information presented here, which will explain the details of this project.

Your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

1. PURPOSE OF THE STUDY

The purpose of this research study is to develop and empirically test an explanatory Employee Green Behaviour (EGB) structural model that will provide a valid answer to the research-initiating question of why employees vary in the extent to which they display/ engage in EGB.

2. PROCEDURES

If you volunteer to participate in this study, we would ask you to follow a link in order to complete an electronic questionnaire. The questionnaire will be sent to you via e-mail from

your HR manager. You will be required to answer all questions of the electronic questionnaire (expect for those specified) individually. Please try to be as honest and truthful as possible while completing the questionnaire. The questionnaire will take approximately 25 minutes to complete and will contain a combination of questions covering your employee green behaviour. Once completed, the questionnaire will automatically be saved online as the electronic system used will record the data automatically.

(Please complete the questionnaire before 30th June 2018.)

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Participation in this research study will not directly benefit you. However, this research will contribute to the academic field of Industrial Psychology. Moreover, the development of this EGB structural model will potentially assist in the development of interventions aimed at enhancing EGB. The planet and future generations will hopefully benefit from interventions aimed at enhancing EGB.

4. PAYMENT FOR PARTICIPATION

Neither you, nor your organisation will receive any payment for participating in this study. However, you can stand a chance to win one of two Takelot vouchers to the value of R 1 000 each. If you have completed the survey, you can voluntarily chose to follow a link to another independent electronic questionnaire that will only require your email address. Your email address will be required for you to enter the lucky draw. The winner will be randomly selected. Your email address will not be used for any other purpose than to contact the winner of the lucky draw. I.e. you will not be spammed!

5. RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. If you have questions regarding your rights as a research subject, contact Ms Maléne Fouché (mfouche@sun.ac.za; 021 808 4622) at the Division for Research Development at Stellenbosch University.

6. CONFIDENTIALITY

Your information and response to the survey will be protected. Any information that is obtained in connection with this study, and that can be identified with you, will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of restricting access to data to the researchers (Eileen Albertyn and Prof Callie Theron). The data will be stored on a password protected computer, and only aggregate

statistics of the sample will be reported. Although you will be asked to please identify your current employer/ the organisation that you work for; the identity of your organisation will also remain confidential. The identity of the participants will never be revealed.

7. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact Eileen Albertyn (0617325683 or 17521912@sun.ac.za) or Prof Callie Theron (021 808 3009/084 273 4139 or ccth@sun.ac.za).

I confirm that I have read and understood the information provided for the current study. I agree to voluntarily participate in this survey.

YES NO

APPENDIX B: EMPLOYEE GREEN BEHAVIOUR QUESTIONNAIRE

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
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STELLENBOSCH UNIVERSITY

CONSENT TO PARTICIPATE IN RESEARCH

Title of the research proposal: Development and Empirical Testing of an Explanatory Structural Model of Employee Green Behaviour

Consent form addressed to: Organisational employees

Dear prospective participant

My name is Eileen Albertyn, a masters student from the Department of Industrial Psychology at Stellenbosch University, and I would like to invite you to take part in a survey. The results of which will contribute to my master's thesis, in order to complete my masters degree in Industrial Psychology. You were selected as a possible participant in this study because you are currently employed at a South African organisation, and therefore satisfy my sample requirements.

Please take some time to read the information presented here, which will explain the details of this project. Your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

1. PURPOSE OF THE STUDY

The purpose of this research study is to develop and empirically test an explanatory Employee Green Behaviour (EGB) structural model that will provide a valid answer to the research-initiating question of why employees vary in the extent to which they display/ engage in EGB.

2. PROCEDURE

If you volunteer to participate in this study, we would ask you to follow this link in order to complete an electronic questionnaire. You will be required to answer all questions of the electronic questionnaire (except for those specified) individually. Please try to be as honest and truthful as possible while completing the questionnaire. The questionnaire will take

approximately 25 minutes to complete and will contain a combination of questions covering your employee green behaviour. Once completed, the questionnaire will automatically be saved online as the electronic system used will record the data automatically.

(Please complete the questionnaire before 10 July 2018.)

3. POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Participation in this research study will not directly benefit you. However, this research will contribute to the academic field of Industrial Psychology. Moreover, the development of this EGB structural model will potentially assist in the development of interventions aimed at enhancing EGB. The planet and future generations will hopefully benefit from interventions aimed at enhancing EGB.

4. PAYMENT FOR PARTICIPATION

Neither you, nor your organisation will receive any payment for participating in this study. However, you can stand a chance to win one of two Takealot vouchers to the value of R 1 000 each. If you have completed the survey, you can voluntarily chose to follow a link to another independent electronic questionnaire that will only require your email address. Your email address will be required for you to enter the lucky-draw. The winner will be randomly selected. Your email address will not be used for any other purpose than to contact the winner of the lucky-draw. I.e. you will not be spammed!

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6. CONFIDENTIALITY

Your information and response to the survey will be protected. Any information that is obtained in connection with this study, and that can be identified with you, will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of restricting access to data to the researchers (Eileen Albertyn and Prof Callie Theron). The data will be stored on a password protected computer, and only aggregate statistics of the sample will be reported. Although you will be asked to please identify your current employer/ the organisation that you work for; the identity of your organisation will also remain confidential. The identity of the participants will never be revealed.

7. IDENTIFICATION OF INVESTIGATORS

If you have any questions or concerns about the research, please feel free to contact Eileen Albertyn (0617325683 or ealbertyn@gmail.com) and/or Prof Callie Theron (021 808 3009/084 273 4139 or ccth@sun.ac.za).

*I confirm that I have read and understood the information provided for the current study. I agree to voluntarily participate in this survey.

- Yes
- No

PLEASE NOTE:

The following survey consists of 9 sections. Please complete each question before continuing to the next.
The survey will take about 25 minutes to complete.
The aim of the survey is to assess your green/ pro-environmental behaviour in the workplace.
Please try to answer each question as truthfully as possible.

SECTION 1: EMPLOYEE GREEN BEHAVIOUR (EGB)

EGB refers to scalable actions and behaviours that employees engage in that are linked with and contribute to environmental sustainability. Hence, EGB includes all green, environmental friendly/ pro-environmental behaviour that employees engage in that contributes to, cares for, and has a positive impact on the environment.

EGB consists of five different dimensions:

1) Taking Initiative (the extent to which you display green entrepreneurial behaviour that involves personal risk and sacrifice).
2) Working Sustainably (the extent to which you change and adapt your behaviour to enhance sustainability).
3) Conserving (the extent to which you attempt to minimise waste with the aim of preserving resources).
4) Influencing Others (the extent to which you engage in social behaviour to influence the green behaviour of others).
5) Avoiding Harm (the extent to which you act to reduce the negative impact of organisational activities on the environment).

Please indicate the frequency with which you engage in each of the following green behaviours in the workplace.

[Only use the N/A (not applicable) option if the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Never 1	2	Sometimes 3	4	Always 5	N/A
TAKING INITIATIVE						
I put environmental interests first						
I initiate programmes and policies aimed at benefiting the environment						
I actively initiate pro-environmental actions						
WORKING SUSTAINABLY						
I change how my work is done						
I choose responsible alternatives						
I create sustainable products and processes						
I embrace innovation for sustainability						
CONSERVING						
I reduce my usage						
I reuse materials						
Repurposing (I use materials multiple times for new purposes)						
I recycle						
INFLUENCING OTHERS						
I encourage and support others to act green						
I educate and train others for sustainability						
AVOIDING HARM						
I prevent pollution						
I monitor my environmental impact						
I strengthen ecosystems (act in a way that helps protect and repair ecosystems from the effects of industry and businesses)						

SECTION 2: BEHAVIOURAL INTENTION TO ACT GREEN

Consider the examples of each of the EGB dimensions previously mentioned.

Please indicate how likely you are to do each of the following in your workplace.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Very unlikely 1	2	Neither 3	4	Very likely 5	N/A
Take initiative *(e.g. Putting environmental interests first; Initiating programs and policies; Lobbying and activism)*						
Work sustainably *(e.g. Changing how work is done; Choosing responsible alternative; Creating sustainable products and processes; Embracing innovation for sustainability)*						
Conserve *(e.g. Reducing use; Reusing; Repurposing; Recycling)*						
Influence others *(e.g. Encouraging and supporting others; Educating and training for sustainability)*						
Avoid harm *(e.g. Preventing pollution; Monitoring environmental impact; Strengthening ecosystems)*						

SECTION 3.1: PERCEIVED CONTROL OVER SALIENT CONTROL FACTORS

Consider the following control factors that could conceivably facilitate or impede/inhibit EGB in the workplace.

With respect to each of the following factors, rate the likelihood that you have control over them.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Unlikely						Likely	
	1	2	3	4	5	6	7	N/A
Organisational policies and procedures								
System / process factors								
The nature of my job								
Organisational culture								
My decision making power (authority)								

SECTION 3.2: PERCEIVED POWER OF THE SALIENT CONTROL FACTORS

Consider the following control factors that could conceivably facilitate or impede/inhibit EGB in the workplace.

Rate the power of that each of the following factors have to make it easy (facilitate) or more difficult (inhibiting) for you to display EGB.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Low Power			Neutral			High Power	
	1	2	3	4	5	6	7	N/A
Organisational policies and procedures								
System / process factors								
The nature of my job								
Organisational culture								
My decision making power (authority)								

SECTION 4.1: SALIENT OUTCOMES

Please read through the statements below.

Indicate how bad (1) or good (7) each of the following outcomes are in terms of engaging in EGB.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Very bad 1	2	3	Neutral 4	5	6	Very good 7	N/A
Programmes that protect/benefit the environment	○	○	○	○	○	○	○	○
Policies that protect/benefit the environment	○	○	○	○	○	○	○	○
Sustainable work procedures	○	○	○	○	○	○	○	○
Resource savings	○	○	○	○	○	○	○	○
Emergence of green behaviour in colleagues	○	○	○	○	○	○	○	○
Smaller environmental footprint	○	○	○	○	○	○	○	○

SECTION 4.2: BELIEF STRENGTH

On a scale of 1 (extremely unlikely) to 7 (extremely likely), please rate how strongly you believe that engaging in EGB will result in each of the following salient outcomes.

I.e. if you choose to engage in EGB, how likely is each of the following outcomes?

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Extremely unlikely 1	2	3	4	5	6	Extremely likely 7	N/A
Programmes that protect/benefit the environment	○	○	○	○	○	○	○	○
Policies that protect/benefit the envrironment	○	○	○	○	○	○	○	○
Sustainable work procedures	○	○	○	○	○	○	○	○
Resource savings	○	○	○	○	○	○	○	○
Emergence of green behaviour in colleagues	○	○	○	○	○	○	○	○
Smaller environmental footprint	○	○	○	○	○	○	○	○

SECTION 5: MORAL NORM

Please rate the extent to which you agree or disagree with the following statements.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Strongly Disagree 1	2	3	Neutral 4	5	6	Strongly Agree 7	N/A
I feel guilty if I do not act pro-environmental at work								
I feel morally obligated to act pro-environmental at work								
I feel proud when I act pro-environmentally at work								
I would violate my principles if I do not act pro-environmentally at work								

SECTION 6.1: NORMATIVE BELIEF STRENGTH

Normative belief strength refers to the perceived expectation to act in a specific manner. Different referent groups can have different expectations of your behaviour, i.e. these individuals and groups can approve or disapprove of your engagement in green behaviours.

Please rate your perception of the expectations held by each of the following salient reference groups/individuals towards you engaging in EGB (i.e. how opposed or in favour they will be).

To what extent do you perceive that the following referent groups hold an expectation that you should engage in EGB?

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Extremely Opposed 1	2	3	Neutral 4	5	6	Extremely Supportive 7	N/A
My manager/ supervisor								
My co-workers/ colleagues								
Green lobbyist groups								
My spouse/ partner and close family								

SECTION 6.2: MOTIVATION TO COMPLY

In line with the previous question, please rate you motivation/ the extent to which you want to comply with the expectations of each of the following referent groups/individuals in terms of engaging in EGB.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Not at All 1	2	3	Neutral 4	5	6	Very Much 7	N/A
My manager/ supervisor								
My co-workers/ colleagues								
Green lobbyist groups								
My spouse/ partner and close family								

SECTION 7: REWARDS AND RECOGNITION

Please rate your perception of rewards and recognition for your green behaviour in the workplace.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Very Inaccurate 1	2	3	4	5	6	Very Accurate 7	N/A
My organisation acknowledges my EGB								
My colleagues acknowledge my EGB								
My organisation rewards me for my EGB								
My organisation gives me recognition for my EGB								
My colleagues give me recognition for my EGB								

SECTION 8: PROBLEM AWARENESS

Please indicate whether you agree/disagree with the following statements.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Strongly Disagree 1	2	Neutral 3	4	Strongly Agree 5	N/A
Environmental pollution affects my health						
Environmental problems have consequences for my life						
I worry about environmental problems						
I can see with my own eyes that the environment is deteriorating						
Environmental problems are a risk for the future of my children						
A better environment starts with myself						
People who do not take the environment into account try to escape their responsibility						
Environmental problems are exaggerated						
Too much attention is paid to environmental problems						
The attention given to the greenhouse effect is exaggerated						
Saving threatened species is unnecessary luxury						

SECTION 9: INTERNAL ATTRIBUTION

Please rate the extent to which you disagree (1) or agree (5) with the following statements.

[Only use the N/A option when the question does not apply to you/ if you are unable or unwilling to answer the question. Please try to use this option as seldom as possible.]

	Disagree 1	2	Neutral 3	4	Agree 5	N/A
I recognise that I have a role/ part to play in terms of the current state of the environment						
I recognise that my actions (green behaviour) contribute to the environment						
I share responsibility for the current state of the environment						
I acknowledge that I am accountable for my actions and impact on the environment						
I am personally responsible for my green behaviour/ actions that influence the environment						
I feel obligated to act in an environmentally-friendly manner (i.e. engage in EGB)						

SECTION 10: DEMOGRAPHIC INFORMATION

Please answer the following questions about yourself.

*Please select your age.

- 18-29
- 30-39
- 40-49
- 50-59
- 60-69
- 70+

*Please select your gender.

- Female
- Male
- Other

*Please select your home language.

- Afrikaans
- English
- Ndebele
- Sepedi
- Sotho
- Swati
- Tsonga
- Tswana
- Venda
- Xhosa
- Zulu
- Other

Please select your highest level of education.

- Higher Certificate / Advanced National Certificate
- Diploma / Advanced Certificate
- Bachelor's Degree (3 years) / Advanced Diploma
- Bachelor's Honours Degree/ Postgraduate Diploma
- Master's Degree
- Doctoral Degree

*Please select your current job level.

- Non-managerial
- Lower level managerial
- Middle level managerial
- Upper level managerial

Please type in the name of the company/ institution where you are currently employed:

_____

***THAT'S THE END!**

All of your answers have been automatically saved.

Thank you very much for taking part in my survey- every response will help with my research project. As mentioned in the beginning, all answers will remain anonymous and will not be identifiable to any participating individual.

Do you want to participate in the Lucky Draw?

- Yes
- No

APPENDIX C: INSTITUTIONAL PERMISSION FORM

UNIVERSITEIT·STELLENBOSCH·UNIVERSITY
jou kennisvennoot • your knowledge partner

INSTITUTIONAL PERMISSION TO PARTICIPATE IN RESEARCH

Development and Empirical Testing of an Explanatory Structural Model of Employee Green Behaviour

To whom it may concern

Letter requesting permission for a research study to be conducted within your organisation.

The purpose of this letter is to kindly ask your organisation to partake in a research study conducted by Eileen Albertyn, a master's student in Industrial Psychology at Stellenbosch University. The purpose of this research study is to develop and empirically test an explanatory Employee Green Behaviour (EGB) structural model that will provide a valid answer to the research-initiating question of why employees vary in the extent to which they display/ engage in EGB.

I strongly feel that my research findings will not only be valuable for personal academic reasons, but also for your company and its practices. This is a step towards gathering more information on complex human behaviour, and especially employees' green behaviour. Understanding this type of behaviour could contribute to identifying, motivating, and enhancing it in the workplace.

We hereby request permission to conduct our research within your organisation. The Employee Green Behaviour Questionnaire will be administered for the purpose of the study, via the Stellenbosch University web-based e-Survey service (SUrveys).

If your organisation would agree to participate in the research, I will at a later stage forward you an email with a link to the online questionnaire. I will then kindly ask you to please forward it to as many employees in your organisation as possible. The questionnaire consists of nine sections and will take approximately 25 minutes to complete. Participants can choose whether to be in this study or not. If they volunteer to be in this study, they may withdraw at any time without consequences of any kind. Participants are not waiving any legal claims, rights or remedies because of your participation in this research study.

Neither the organisation, nor participants will receive any payment for participating in this study. Participants in the study will however be eligible to enter in a lucky draw in order to increase the response rate. The lucky draw entails two Takealot vouchers at the value of R 1 000 each. After completing the survey, participants can voluntarily choose to enter the lucky draw by following a link to another independent electronic questionnaire that only requires one's email address. There are no foreseeable risks or discomforts associated with completing this study. This study will only require employees' time and energy.

Any information that is obtained in connection with this study and that can be identified with participants will remain confidential and will be disclosed only with their permission or as required by law. Confidentiality will be maintained by means of restricting access to data to the researchers (Eileen Albertyn and Professor Callie Theron). The data will be stored on a password-protected computer. Only aggregate statistics of the sample will be reported in the research study. The identity of the participants will never be revealed. The identity of the participating organisation will also not be revealed. Additionally, if desired, company-specific aggregate feedback on the latent variables involved in the model can be offered.

The results will contribute to my master's thesis and to the academic field of Industrial Psychology. Moreover, the development of this EGB structural model will potentially assist in the development of interventions aimed at enhancing EGB. The planet and future generations (over the long term) will hopefully benefit from interventions aimed at enhancing EGB in the workplace.

If you have any questions or concerns about the research, please feel free to contact Eileen Albertyn (0617325683 or ealbertyn@gmail.com) or Professor Callie Theron of the Department of Industrial Psychology of Stellenbosch University (021 808 3009/084 273 4139 or ccth@sun.ac.za).

We trust that you will kindly grant us the institutional permission to conduct the EGB study in your organisation. Thank you in advance.

Kind regards,
Eileen Albertyn & Prof Callie Theron

I _____ [name of organisational representative] hereby give institutional permission for Eileen Albertyn and Prof Callie Theron to conduct their EGB research study at _____ [name of organisation] in accordance

with the research proposal that was submitted. If the research will substantially deviate from the undertaking given in the research proposal the undersigned will be informed.

Signature: _____ Date: _____